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ROCKEFELLER PROPERTIES GO TO STEEL CORPORATION.

The item of overshadowing importance as far as the lake region is concerned is the news that Mr. John D. Rockefeller's properties on the great lakes—vast tracts of iron mining lands, a railroad in Minnesota, and a fleet of fifty-six steel vessels on the lakes—have been sold to the United States Steel Corporation. Figures made up in the offices of some of the ore companies in Cleveland immediately following this announcement show that with the Rockefeller properties the big corporation owns mines in the Lake Superior region that produced last year 10,648,934 gross tons of ore, and has a fleet of 112 vessels that are capable of moving in a season, running light to the head of the lakes, 9,720,500 tons. Estimates of the ore consumption of its steel works and furnaces last year are less reliable when figured from such information as is to be had in Cleveland, but this is generally put at about 12,000,000 tons. The Rockefeller mines and railroad in Minnesota are owned (until details of this transfer can be arranged), by a corporation known as the Lake Superior Consolidated Iron Mines. Mr. Rockefeller controls probably three-quarters of the stock. The ships are owned by the Bessemer Steamship Co., the stock of which is entirely owned by Mr. Rockefeller. It is not surprising, therefore, that no details of the transaction have been given out. It is purely a deal between Mr. Rockefeller's representatives and J. Pierpont Morgan. Any rumors regarding the consideration involved in the transaction are thus far of no account. Lake Superior Consolidated Iron Mines stock (the little of it that there is to be had), has sold as high as $160 a share within the past few days. The stock never paid a dividend. A few years ago it might have been had at $10 a share, and in August last small lots of it sold in Cleveland at $60 a share. The company was paying no dividends, but its earnings were being put into new properties. It has been claimed that, including mines leased to the Carnegie and other companies, the Rockefeller interests controlled properties in which nearly 500,000,000 tons of ore had been proved up. On the strength of this statement it is supposed, of course, that the steel corporation paid a big price in this last transaction, and hence the speculation in Lake Superior Consolidated stock.

The working mines of the Lake Superior Consolidated produced last year 1,448,943 tons as follows: Adams, 777,346; Lake Superior, 284,023; Duluth,128,587; Spruce, 101,675; Pillsbury, 101,032; Sellers, 56,280. Among mines inactive were the Minnewas, Etna, Cloquet, Hull, Burt and Rust. Some of the most important of the mines which the company owned in fee, notably the Mountain Iron, are leased to Oliver Mining Co. (Carnegie) and other companies. The Lake Superior Consolidated has an outstanding capital stock of $29,887,448, and a total bonded obligation of $5,995,000, which is the direct mortgage indebtedness of the Duluth. Mesabi & Northern Railway, a line 130 miles in length, which it owns.

THE OUTLOOK ON THE LAKES.

At this time a year ago men were at work in all parts of great lakes getting ships in readiness to move upon announcement that the Straits of Mackinaw were free of ice, as all arrangements had been made for a very active season at freights highly profitable for the vessels. Thus far nothing has been done towards preparing vessels for the coming season, as conditions are the opposite of what they were a year ago, and even if the question of freights was settled, it seems almost impossible to avoid labor troubles in some lines. Everything still points to delay, and a light movement of freight in the early part of the season. Some progress has been made, however, during the past few days. With the scope of the United States Steel Corporation settled, a move has been made towards fixing prices of ore for the interests that are not producers of their own raw material, and it is expected that the Bessemer ore association will make an announcement on this score within the coming week. It is fortunate for the ore interests that the steel combination caused delay, as the advance in pig iron, and other conditions that have arisen of late, have all tended to strengthen the ore situation.

Representatives of longshoremen employed on the ore and coal docks of Lake Erie have been in conference with the dock managers, and it is expected that they will conclude an agreement with the close of the present week. The workmen's representatives started in with a demand for a ten instead of a twelve-hour day, and with a schedule of wages even higher than last year. They asked, for instance, for 15½ cents as a shoveling charge for unloading iron ore, as against 14 cents last season. It is understood that the demand for a shorter day has been abandoned, and it is the general opinion that in the final compromise the shoveling charge for ore will be 13 cents, as compared with the 14-cent charge of last season, with the coal shoveling schedule and day labor charges cut down in proportion to the slight reduction for ore shoveling. The railroads hauling coal from the West Virginia and Pittsburg districts to Lake Erie ports have made a small reduction in rates and it is expected that prices of coal, which will soon be announced, will be somewhat lower than they were a year ago, but the reduction in steamboat fuel will not be sufficient to cut much of a figure in operating expenses of the vessels. It is quite evident, therefore, that the ships are to be confronted with costs very little below those of last year, and the additional disadvantage of about 6,000,000 tons more capacity than last year, if we include vessels laid up last season, the new ships now leaving the stocks and the new vessels of 1900 that did not get in a full season. Furthermore, it is quite probable that a strike in the Anthracite coal region will cut out this branch of the lake trade for a long period, and there are no signs of a grain movement from the head of Lake Superior, while the shipments from Chicago are not expected to equal an average season. For all these reasons the owners of ships, aside from those that have business on account of ore or railroad connections, are idle and have made no move towards meeting the engineers' strike or any other condition that they may encounter when the time has finally arrived for starting their vessels.

TO PROTECT CHICAGO RIVER NAVIGATION.

A meeting of the special committee appointed to represent the Lake Carriers' Association in the matter of the protection of navigation interests against damage in Chicago river resulting from the operations of the Chicago drainage canal was to have been held in Philadelphia this week, but the meeting was found to be unnecessary. Mr. Frank J. Firth, chairman, acting for the committee, sent the following letter under date of March 18, to the secretary of war:

"In further eply to your favor of Feb. 28, 1901, I beg leave in response to your invitation to submit on behalf of the Lake Carriers' Association the following suggestions regarding supplemental orders or instructions to the local engineer officer at Chicago. We recommend:

"That you issue such supplemental order as will insure the restriction of the discharge of water through the Chicago drainage canal so that it shall not exceed 200,000 cu. ft. per minute and will not operate in any event to produce a current exceeding three-quarters of a mile per hour.

"That the United States engineer at Chicago be instructed to supervise and insure the strict compliance with this order and to invite vessel owners and others interested to communicate promptly to him all cases where the order has not been observed or where any modification of such order may be desirable in the interest of the safe and economical navigation of the Chicago river.

"That the early construction of controlling works at or near Robey street be required, as this is essential to protect those navigating the river from the sudden changes in depth of water and current that have been causing so much delay, damage and expense to vessel owners.

"That nothing be done that will in any way impair the existing right of the United States to make such further regulations as may hereafter be demanded in the interest of the safe and economical navigation of the Chicago river or of the maintenance of the general levels of the great lakes.

In view of the near approach of the opening of navigation for the lake season of 1901, we earnestly urge that the foregoing recommendations may receive your early and favorable consideration."

GRAIN SITUATION AT DULUTH.

G. A. Tomlinson, vessel agent at Duluth, furnishes the following table showing quantity (bushels) of grain in store in Duluth elevators March 18 and on the same date a year ago:

	1900.	1901.
Wheat	14,671,153	8,242,565
Barley	184,154	74,451
Flax	315,678	328,746
Oats	243,748	1,088,247
Rye	417,188	340,486
Corn	970,854	4,907,540
	16,802,775	14,982,035

Weekly receipts at this time last year were averaging about 1,750,000 bushels; now the weekly average is only 600,000 bushels.

A careful estimate shows 285,000 tons bituminous and practically no anthracite coal in stock. The weather is cold; no decrease in area or thickness of ice since last report.

A meeting of the executive committee of the Great Lakes Towing Co. was held in Cleveland Wednesday. It was said that no business of special importance was transacted, but that another meeting would be held in a week or ten days when plans for the coming season would be fully outlined. One of the officials of the company said regarding opposition: "Most of the talk of opposition has been simply newspaper reports from Buffalo. We have found that with practically every fleet of vessels of any importance on the lakes represented by stockholders in our company, our position is really stronger than we counted upon some time ago when we passed a dividend, although we had an abundance of money with which to pay it, and took other steps to meet opposition in a very determined way this season. Probably we made a mistake in recognizing such competition as we had encountered, but if so it only served to prove to us that we had the business by reason of the interests that are represented in our company, and anyhow we wanted to be doubly sure of our position before starting upon another season. We know now that we could buy up the opposition at about any price we might name." Messrs. A. B. Wolvin of Duluth, W. E. Fitzgerald of Milwaukee, Edward Smith of Buffalo, and Capt. James Davidson of West Bay City, were members of the executive committee who were in Cleveland Wednesday to attend the meeting.

The United States Court of Appeals at St. Louis has cut down Judge Lochren's award of $10,500 for salvage in favor of White Line Towing Co. of Duluth for services in rescuing the steamer Arthur Orr and cargo to $5,200. The case was that of C. W. Elphicke and others, owners of the Orr, against White Line Towing Co. The question in the case is whether Capt. Singer of the towing company agreed to assist for the same compensation as Capt. Inman, both being at the wreck with outfits and the latter working by the day. The underwriters claim Singer agreed to work as cheaply as Inman, while Singer claims he said he would accept going rates for such work. Both the towing company and underwriters appealed from the decree of the United States court for $10,500 salvage. The Arthur Orr was wrecked Nov. 21, 1898, at Baptism river, north shore of Lake Superior.

A contract for 4,000 tons of bridge work has been placed with the American Bridge Co. by the Chicago & Alton road.

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SHIP BUILDING IN THE UNITED STATES.

A VERY INTERESTING DISCUSSION OF THE SUBJECT BASED UPON THE OUTPUT AT CLEVELAND AS COMPARED WITH OTHER DISTRICTS OF THE COUNTRY.

A Cleveland vessel owner, who modestly refuses permission to use his name, has prepared the following very interesting paper regarding ship building in Cleveland, on the great lakes, and throughout the United States. Although the article was written with a view to showing Cleveland's prominence from the standpoint of tonnage output, great pains are taken to explain that the naval vessels and the better class of merchant ships built on the seaboard are far more costly than the freighters of the lakes. All the tables and extracts from reports of the United States commissioner of navigation have been verified by the Review. The paper follows:

In a brief paper regarding the ship building industry of Cleveland, some figures dealing with the industry in all the lake cities and throughout the country will very probably prove interesting. A table or two showing tonnage owned in the leading districts of the United States are also presented, as it is natural that ships should be owned in the localities in which they are built. In the ownership of vessels Cleveland ranks next to New York, the leading port of the United States. In the building of ships Cleveland leads all ports in the country. Let it be understood, however, that this means merchant ships, not vessels of war. It cannot be said that from a ship building standpoint the works in Cleveland, or any of the other ports of the great lakes, are as important as the large plants of the Newport News Ship Building & Dry Dock Co. at Newport News, Va., the Wm. Cramp & Sons Co. at Philadelphia, the new works of New York Ship Building Co. at Camden, N. J., or the Union Iron Works at San Francisco. These very large establishments build vessels of war that sometimes involve items of millions as against thousands in merchant ships of about the same dimensions, as will be shown later on. It follows that the number of men employed at these works on big battleships and cruisers, requiring three or four years for their completion, is far greater than on the merchant work of the great lakes; and it must be stated also that the ship of 7,000 or 8,000 tons capacity built for the lakes at a cost of say $300,000, would cost very much more than that amount if built for ocean service, and would require far more labor, more material and some more machinery in her construction. All this must be taken into account in the comparisons that are made in the tables.

All the figures are from the last annual report of the United States commissioner of navigation, Mr. E. T. Chamberlain, and the tonnage is in all cases gross measurement.

As Cleveland is not only the leading ship owning but also the leading ship building port of the great lakes region, it will be interesting first to note that in the ten years from 1891 to 1900 inclusive, the great lakes produced 450,089 tons of steel steam merchant ships, compared with 292,741 gross tons for all the seaboard. (Note the term steel steam ships—the modern kind of vessels—not craft of all kinds). This is shown by the following table, taken from the 1900 report of the commissioner:

STEEL STEAM VESSELS BUILT IN UNITED STATES.

	Atlantic.		Pacific.		Great Lakes.		Total.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
1891	3	9,342	.....	.....	31	48,939	34	58,281
1892	14	16,040	1	400	16	23,045	31	39,485
1893	11	12,119	1	3,528	26	49,983	38	65,630
1894	19	26,065	1	103	11	19,920	31	46,088
1895	23	19,656	1	2,504	8	18,020	32	40,180
1896	21	32,035	2	707	25	63,591	48	96,331
1897	24	21,407	.....	.....	19	56,670	43	78,077
1898	26	17,014	5	5,491	17	25,287	48	47,792
1899	49	51,326	12	3,317	19	48,375	80	103,018
1900	51	70,548	3	1,141	26	96,259	80	167,948
Total	241	275,550	26	17,191	198	450,089	465	742,830

It will be noted from the table that there has been a marked increase in steel steamship building on the seaboard during the past two years, due to the fact that during the war with Spain the government purchased a large number of steamers that have since been replaced, to a large degree, by new vessels for the coasting lines, and it is true also that quite a number of vessels of the "tramp" kind are being built on the Atlantic seaboard of late for foreign trade. A few of these were built in the hope of a ship subsidy measure being passed for foreign trade vessels, but in some cases the owners have decided to make a trial of operating modern "tramp" vessels in the foreign trade, even without government aid. This is but one of the abundant signs of a national determination to promote ship building, commercial and naval.

Turning to the number and tonnage of ships of all kinds, as well as iron and steel ships, built during the year ended June 30, 1900, we find Cleveland in the lead of the several principal ship building ports of the country. Following is the government report on this score:

SHIP BUILDING AT LEADING POINTS IN THE UNITED STATES DURING THE YEAR ENDED JUNE 30, 1900.

	Vessels of all kinds.		Steel and iron vessels.	
	No.	Gross tons.	No.	Gross tons.
Cleveland, O.	12	42,214	9	42,119
Newport News, Va.	10	28,542	7	28,202
Chicago, Ill.	7	24,546	5	24,504
Detroit, Mich.	6	15,725	4	15,693
Wilmington, Del.	26	18,363	7	14,033
Port Huron and Bay City, Mich.	12	18,867	4	13,493
Baltimore, Md.	30	17,389	8	13,213
Philadelphia, Pa.	29	13,982	15	11,528
New York	175	38,739	14	7,216
Toledo, O.	5	5,959	3	5,591
Bath, Me.	34	36,792	4	5,420
Buffalo, N. Y.	17	6,421	2	4,000

The limited amount of wooden ship building in ports where the industry is carried on along steel lines is especially noticeable in the foregoing table. It is shown, for instance, that while Cleveland built during the year twelve vessels of 42,214 tons, the nine that were of steel aggregated 42,119, so that the other three of 95 tons were evidently only yachts.

It was shown in one of the above tables that in the 1890-1900 decade 450,089 gross tons of steel steam vessels were built on the lakes, compared with 292,741 tons on all the seaboard. In the construction of wooden vessels and vessels of the smaller classes, however, the comparison favorable to the lakes does not hold out in the same degree, as shown by the following summary dealing with ship building of all kinds during the ten years:

COMPARISON OF VESSELS OF ALL KINDS BUILT ON THE ENTIRE SEABOARD AND ON THE GREAT LAKES DURING THE PAST TEN YEARS.

	On the entire seaboard.		On the Great Lakes.	
	Number.	Tonnage.	Number.	Tonnage.
1891	1,066	237,462	204	111,856
1892	1,127	138,863	169	45,969
1893	690	102,830	175	99,271
1894	650	80,099	106	41,985
1895	527	67,127	93	36,353
1896	511	102,544	117	108,782
1897	673	103,504	120	116,937
1898	742	112,879	87	54,084
1899	937	196,120	122	80,366
1900	1,107	249,006	125	130,611
Total	8,030	1,390,434	1,318	826,214

It has been shown that for ten years or more past the merchant ships building on the lakes are nearly all of very large capacity and of the steel steam kind, and so we find that there are owned on the great lakes more ships of 1,000 tons and over than in all other parts of the country combined. In the number of ships of this kind Cleveland again follows New York, as will be seen by the following table:

Vessels of 1,000 tons and over owned in:	Number of vessels.	Gross tons.
New York, N. Y.	262	518,021
Cleveland, O.	136	319,318
Duluth, Minn.	80	256,639
San Francisco, Cal.	95	172,211
Detroit, Mich.	60	113,299
Buffalo, N. Y.	47	95,995
Boston, Mass.	46	79,572
Bath, Me.	35	67,633
Baltimore, Md.	31	58,875
Philadelphia, Pa.	30	42,881

One more table will serve to show the positions of the leading ports of the country as regards the ownership of vessels of all kinds, as well as steel and iron vessels. Such a summary follows:

NUMBER AND TONNAGE OF VESSELS OWNED IN THE PRINCIPAL PORTS OF THE UNITED STATES.

	Vessels of all kinds.		Iron and steel vessels.	
	No.	Gross tons.	No.	Gross tons.
New York, N. Y.	3,900	1,112,989	303	428,912
Cleveland, O.	310	376,330	105	234,513
San Francisco, Cal.	813	308,727	48	83,258
Duluth, Minn.	270	300,392	88	241,300
Philadelphia, Pa.	625	216,836	128	55,910
Puget Sound	895	204,055	23	30,611
Boston, Mass.	485	174,941	28	43,985
Baltimore, Md.	1,043	159,268	85	73,380
Detroit, Mich.	246	157,533	26	56,838
Buffalo, N. Y.	296	137,407	40	60,740
Bath, Me.	167	99,092	5	12,739

As noted above, the work of a few seaboard ship yards on naval contracts is often quite as important from a ship building standpoint as all the orders of the country for merchant ships. Since 1884-5 seventy-one vessels of over 360,000 tons displacement, not including many torpedo boats and torpedo boat destroyers, have been built or ordered for the navy. New naval vessels now well along in the different stages of construction aggregate 113,326 tons displacement, namely, six battleships, four monitors, six protected cruisers, sixteen torpedo boat destroyers and fifteen torpedo boats, a total of forty-seven. The total value of ships now under construction for the navy—hulls and machinery alone—is $33,700,000, and under contracts let by the department recently, the builders have begun, or are about to begin, work on five more battleships, six armored cruisers and three protected cruisers, or fourteen in all, aggregating 179,800 tons displacement, of which hulls and machinery alone will cost approximately $50,400,000.

Mr. E. T. Chamberlain, United States commissioner of navigation, has notified all collectors of customs, masters and owners of ships, that the new international code of signals came into use on Jan. 1, 1901. From Jan. 1, 1901, until Jan. 1, 1902, the new edition of the code and the old edition will be used concurrently, the use of the new edition being denoted by the hoisting of the code pennant with the fly tied to the halyards, having above it a black ball or shape resembling a ball. After Jan. 1, 1902, the new edition alone will be used and its distinguishing sign will thenceforward be the code pennant hoisted in the ordinary way.

The city council of St. John has resolved to apply to the legislature of New Brunswick for authority to bonus ship building. Messrs. H. Harding, J. Thomson and George McAvity, representing the Steel Ship Building Co., conferred with the council, and as a result of the conference a bill is to be prepared authorizing the city to grant $200,000, half in land, for the site, or cash to pay for it, the other half as a subsidy for machinery, to be paid only after the ship building works have been established. The company proposes to produce 25,000 tons of shipping a year and is to invest $3,000,000.

FROM THE SHIP YARDS OF THE CLYDE.

AN INTERESTING LETTER DEALING WITH DIFFERENT TYPES OF NEW SHIPS —OUTLOOK FOR THE INDUSTRY NOT ENCOURAGING—THE STEAM TURBINE TYPE OF PASSENGER STEAMER.

[Special correspondence to the Marine Review.]

Glasgow, Scotland.—Whatever may be the reason, the prospects of the ship building industry are not improving. Prices have come down considerably of late, but new contracts have not come forward. Steel ship plates have been brought back to £6 5s. by the Yorkshire makers, and coal is now fully 5s. per ton cheaper here than it was a year ago. Still ship owners are not tempted to buy, and only about 3,000 tons of new orders were booked by Scotch ship builders in February, though in that month they put upwards of 60,000 tons of new shipping into the water. Thus the quantity of work on hand is materially reduced, and it will be rather a blue lookout for the autumn if some good orders are not placed within the next two or three months. There is perhaps a feeling that prices have not reached bottom, and certainly all material has not come down as much as steel, nor have wages yet been affected in either the ship yards or the engine shops. But it is doubtless the low range of freights and the depressing business outlook generally, deterring ship owners from contracting anew. No ship building material is now being offered here from the United States and contracts made last year are being only slowly executed. A 10,000-ton contract for ship plates that ought to have been completed in 1900 was not half delivered at the end of February. This looks as if American manufacturers had either oversold themselves or experience difficulty in complying with British requirements.

The amount of tonnage launched in Scotland in February was 61,600 tons in eighteen vessels comparing with twenty-three vessels of 29,510 tons in February of last year. This makes the total for the year, insofar as expired, 75,570 tons, far away ahead of the two initial months of any previous year. This is because of the unprecedented fact of two huge armored cruisers for the British navy having been launched on the Clyde on one day. One of these was the first-class armored cruiser Good Hope of 14,100 tons displacement and engines of 30,000 I.H.P., built and engined by the Fairfield Ship Building & Engineering Co. The other was the first-class armored cruiser Bacchante of 12,000 tons displacement and engines of 21,000 I.H.P., built and engined by John Brown & Co., Ltd., Clydebank, who also supply the armor plates from their Sheffield works. John Brown & Co. also launched a torpedo boat destroyer of 466 tons and 9,000 I.H.P. for the British navy. These war ships accounted for a large portion of the output, which included only one sailing ship, a three-master of 1,950 tons, built by William Hamilton & Co., Port Glasgow, for London owners. There were besides nine merchant steamers, ranging from 1,000 to 8,000 tons, a couple of small coasting steamers, a couple of steam trawlers for the Aberdeen fishing fleet and a screw tug for foreign owners. All but about 6,000 tons of the new tonnage was for Great Britain and all but 1,600 tons of it was built on the Clyde. The following figures are interesting as showing the work of Scotch ship builders in comparison with past years:

OUTPUT OF SCOTCH SHIP YARDS.

Year.	February. Tons.	Two months. Tons.
1901	61,600	75,570
1900	29,510	60,720
1899	29,008	60,805
1898	28,602	43,582
1897	16,273	30,425
1896	39,391	56,844
1895	19,816	41,784
1894	25,064	43,153
1893	15,922	28,722
1892	35,247	51,271
1891	23,040	41,720

One of the most interesting products of the month was the handsome twin screw Ruapehn, built by Wm. Denny & Bros., Dumbarton, for the New Zealand Shipping Co., nearly all of whose well-known fleet has come from this yard. The Ruapehn is 457 ft. long by 58 ft. molded breadth, and 42 ft. molded depth. She is of 8,000 tons and has two sets of triple expansion engines with four cylindrical boilers. There is large and handsome accommodation for first, second and third-class passengers—the first in a deck house amidships on the shelter deck—and for each class there is a separate smoking room and reading room. Being intended for the regular run between London and New Zealand, the Ruapehn has her three forward holds especially insulated for the carriage of frozen meat. The installation is by Harlam of Derby, and the refrigerating plant is located on the upper deck. The outfit for handling of cargo is most complete and the electric installation throughout is by Denny & Co.

SOME RECENT INTERESTING PRODUCTS OF THE CLYDE.

The other day took place the trials of the new Peninsular & Oriental liner Sicilia, launched in December last by Barclay, Curle & Co., Ltd., near Glasgow. This is a twin screw boat, 465 ft. by 52 ft. 3 in. beam by 33½ ft. depth, of 6,800 tons gross and 8,000 tons dead weight capacity. She has roomy accommodations for ninety first-class and seventy second-class passengers, and is also specially fitted up for carriage of troops to and from India. There are two sets of twin screw engines of 4,500 I.H.P., with large double ended boilers having a working pressure of 170 lbs., and also an auxiliary boiler. This is the first vessel built by Barclay, Curle & Co. for the P. & O. Co., nearly all of whose fleet has come out of the yard of Caird & Co. at Greenock. The Sicilia is neither one of the largest nor one of the fastest of the fleet, but is a handy, useful vessel of the intermediate type.

The armored cruiser Good Hope, mentioned above as having been launched by the Fairfield Co., is the first of a new type of vessel of which four were ordered by the admiralty, three from private builders, and one from the government dry dock at Pembroke. They will be known as the Drake class, and are of similar dimensions to the now well-known Powerful and Terrible, but with a different arrangement of the armor and a heavier armament. With engines of 30,000 I.H.P. she is to make a speed of 23 knots at sea. Her propelling machinery consists of two sets of triple expansion engines in water tight compartments, each having four inverted cylinders working on four cranks. Each high pressure cylinder is 43½ in., each intermediate 71 in. and each low pressure 81½ in. diameter, and all are adapted for a stroke of 4 ft. The crank, thrust and propeller shafting is of hollow forged steel. The feed, bilge and hot well engines are all independent of and separate from the main engines, and steam for all the auxiliary machinery is supplied by a special range of steam pipes. The boiler equipment consists of forty-three Belleville water tube generators with economizers, arranged in four groups, each group in a water tight compartment, and all designed to work at a pressure of 300 lbs. The Bacchante, the other cruiser mentioned, will also be boilered with the Belleville water tubes, thirty of them, fitted with economizers and working at a pressure of 300 lbs.

STEAM TURBINE TYPE OF PASSENGER STEAMER.

Mr. Parsons, the inventor of the marine steam turbine and the builder of those much-talked-of craft, Turbinia and Viper, was here the other day explaining the design of a new turbine steamer for river service, which is being built by William Denny & Bros., Dumbarton, for a small syndicate. This craft, whose evolution will be watched with the keenest interest by ship builders and engineers all over the world, is to be 250 ft. long by 30 ft. beam and by 10½ ft. depth, molded to main deck, with 17 ft. 9 in. to promenade deck. In model and general equipment she will be of the type of the well-known Clyde coasting pleasure steamers, with such slight modifications as the introduction of a new type of machinery will require. This machinery is to consist of three separate turbines driving three screw shafts. The high pressure turbine is to be placed on the center shaft and the two low pressure turbines on the outer shafts. Inside of the exhaust ends of each of these are to be placed the two astern turbines, which are in one of the low pressure motors and operate by reversing the direction of rotation of the low pressure motors and outside shafts. In passing from the boilers to the turbines the steam is expanded successively up to 125 fold. At 20 knots, which will be the speed of the turbine passenger boat, the speed of revolutions of the center shaft will be 700 and of the two outer shafts 1,000 per minute. When coming alongside a pier or maneuvering in or out of harbor, only the outer shafts will be used. This interesting vessel is to be ready by July 1 for a daily service on the Firth of Clyde between Fairlie and Campbeltown—a route allowing of an almost continuous run.

BUFFALO GRAIN ELEVATORS.

Buffalo, March 20.—It seems odd that the impression still prevails that the Buffalo elevator situation is controlled by local owners, so that we are even now regaled with flings about the "pirates of the termini" and that sort of thing. The genius who invented that phrase has done the Buffalo elevator owner great injustice, though his power for harm is past. Let it be said, now for all time, apparently, that the aforesaid "pirates" are no more nor less than the through lines of railroad, both here and at the New York terminus. I said to a private elevator owner the other day, a man who has been in the business a long time and has a good elevator:

"Why are you not holding your meetings and getting ready for the season's pool? It expires next month, does it not?"

He shrugged his shoulders and replied in a dry way: "We used to hold meetings and have a lot of trouble over the fixing up of the pool, but that is past. We take what they give us now."

Of course "they" were the railroads. The New York Central now owns five elevators and all the other through roads are provided for, if they care to be. So far as the grain itself is concerned, it is a good arrangement. There is much less difficulty, because there is less difference of opinion and fewer people to satisfy. It is simply one of the tendencies of business, all of which take the same direction. First the canal elevator was laid aside and now the private elevator takes a second place. It is still used, as a rule, for there is need of it, but as to exercising any control it does not and never will again. There is some tendency towards establishing control of this or that elevator by shippers east or west, but even that is far from disturbing the roads in the hold they have on the situation. Of course, there are many wry faces over it all, but there is nothing to be done and nobody thinks of making the effort.

Sometime ago a good elevator was offered for sale and a fair price was offered for it, but it was refused. If half that price could be obtained for it now perhaps it would be taken. I am not saying these things to cry down the value of the elevators. Actually they are worth as much as they ever were and with the gradual change of them over from wood to steel their real value is increasing very fast. The need of such property will always be great so long as the lake grain trade is what it is, but local control is gone, that is the point.

It would be impossible to make much of a guess as to the stopping place of this shifting of ownership. We are too much dazed over it to try, and we are too much fascinated over the rush of things to weep over it, unless we happen to be hit directly. Then we ought to be forgiven for some expressions that have a bitter turn to them. It looks now as though this absorption business was going to continue till the supreme authority of the land stepped in and took charge. That this authority can ultimately be anything but the people themselves we must deny, if we have any faith in progress and the survival of the individual. Just now we are growing more and more dizzy over the rush towards unifying capital, but I have no idea that we shall really lose our heads in that way.

The Buffalo elevators have held quite a good quantity of grain all winter, but that is, as usual, a mere indication that the eastern and export trade is lighter this winter than common. There is still close to 1,000,000 bushels of Duluth wheat afloat here yet, with not much apparent desire to move it right away. But the vessels will be needed soon and something must be done with it.

It does not look now as though there would be much outward change in the elevator situation at present. There will be two fine new steel ones added during the summer, but that is a mere incident. The actual change of control of them as a whole is accomplished. Will the people who are still persuaded that the old style is in force please make a note of the fact?

JOHN CHAMBERLIN.

AROUND THE GREAT LAKES.

It is officially announced from the office of the Chandler Iron Co., Chicago, that on March 12, W. W. Watson, Jr., succeeded L. T. Beecher as secretary of that company.

Capt. William A. Irvine, last season master of the steamer Iron Duke, has been appointed successor of the late Capt. E. B. McQueen in the command of the steel steamer Senator.

The Odanah Mining Co. has sold its mines, known as the Carey and Superior, near Hurley, on the Gogebic range, to Pickands, Mather & Co. of Cleveland. The mines last year produced 125,496 tons of ore.

Capt. Robertson of Sarnia, who has been a very popular captain on the Empire and Monarch steamers of the North Western Transportation Co., has resigned his position. The captain has served the company for twenty years.

Of eight steel freight steamers being built by the American Ship Building Co. for Mr. J. C. Gilchrist and others of Cleveland four are under way at the company's Lorain yard. The last of these four Lorain ships, the Jupiter, was successfully launched Tuesday.

Capt. H. C. McCallum had much to do with organizing the Detroit harbor of the American Association of Masters and Pilots, and from that time to Jan. 1 last was its captain, and a hard worker as well for its interests. At a meeting of the harbor on Wednesday of last week he was presented with a very elaborate past-captain's jewel as a token of the appreciation of his services by his associates.

A Washington dispatch announces that life saving stations are to be built early this coming summer at the lower end of South Manitou island, Lake Michigan, and also at Sleeping Bear point on the Michigan mainland, directly south. These two points are on either side of a channel that is particularly dangerous in bad weather. Contracts for building the stations will be let next month and work on them will be completed before the season closes.

Capt. William Wadsworth, an old lake vessel master, died at his home, No. 462 Euclid avenue, Cleveland, during the present week. He had been associated with the lakes for over forty years and was well known among the older vessel men. He sailed the Brightey, the Nonpareil, the John P. Marsh and George W. Adams. For a short time in the seventies he engaged in the lumber business, the firm being known as Richardson & Wadsworth.

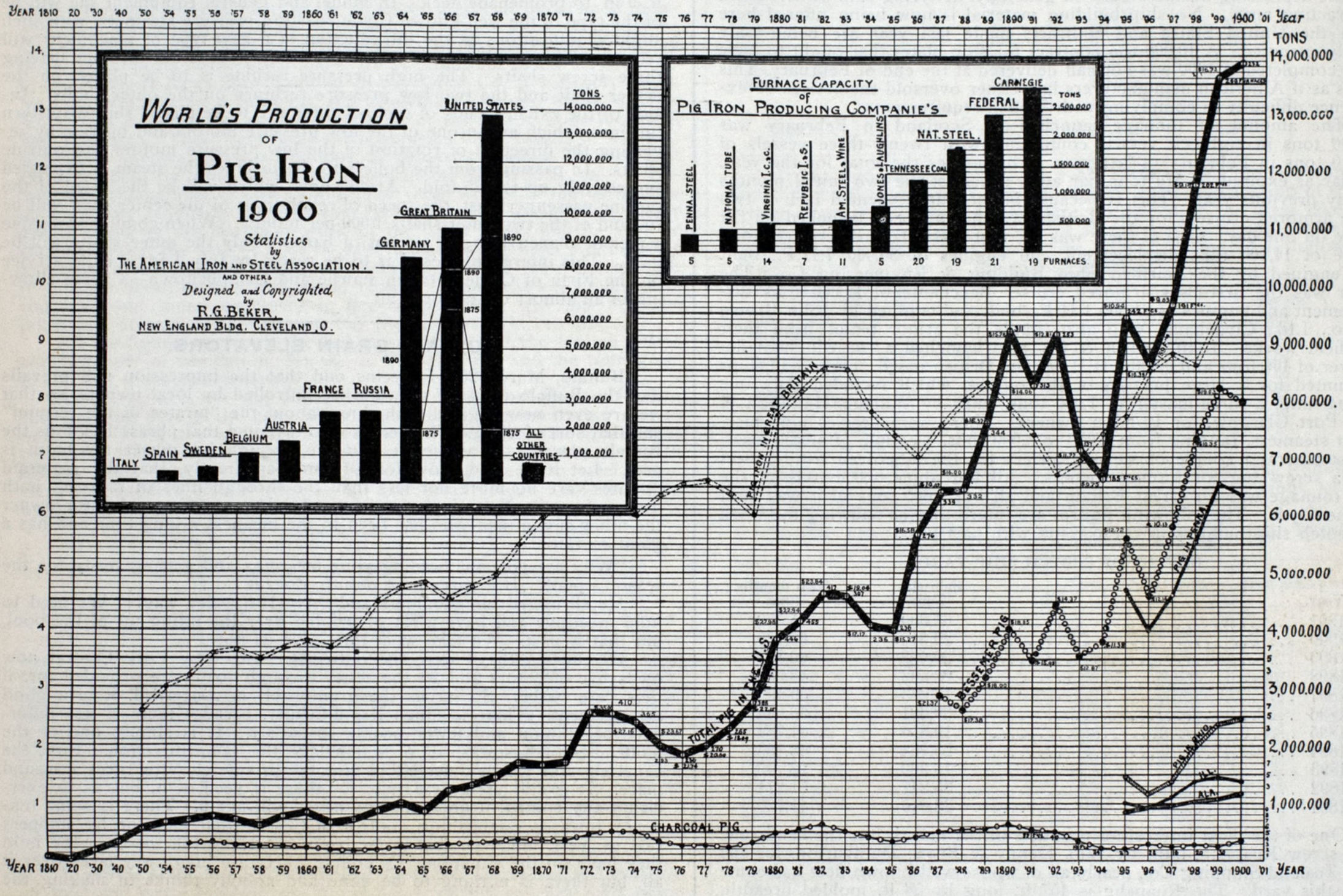
Another ore dock at Escanaba, Mich., which has been in course of construction during the past year by the St. Paul road, is now entirely completed and is ready for use as soon as navigation opens. The dock is 720 ft. long, 52 ft. wide and 62½ ft. high. It contains 120 ore pockets, each pocket having a capacity of 250 tons, the total capacity of the dock being 30,000 tons. The dock and yards are so constructed that the capacity of both may be doubled as more capacity is needed.

It is expected that two steel freight steamers, each of about 4,000 tons capacity, which are building at the Superior Works of the American Ship Building Co. for D. R. Hanna and others of Cleveland, will be ready to launch about April 1. Their dimensions are as follows: Keel length, 318 ft.; length over all, 336 ft.; beam, 42 ft.; molded depth, 26 ft. 6 in. They will be provided with triple expansion engines having cylinders of 20, 33 and 54 in. diameter and 40 in. stroke. The boilers, two for each steamer, will be 13 ft. in diameter and 11 ft. 6 in. long.

A notice from the office of the steamboat inspection service at Washington is to the effect that the act prohibiting passenger steamers from carrying naphtha, gasoline or other explosives in tanks has been amended so as to make the matter optional in the case of automobiles. This action is the result of strong effort on the part of automobile owners who were anxious to take their vehicles with them and who found it impossible to take them on board of passenger steamers, as the law prohibited the carrying of automobiles operated by gasoline, benzine, naphtha or similar liquids when the liquid was contained in a tank.

The Jenks Ship Building Co.'s plant at Port Huron, Mich., was burned down at midnight Tuesday night. The loss is estimated at $100,000. Fire started in the slab house and spread so quickly that before the fire department arrived the machine shop was partly destroyed. The firemen concentrated their efforts in endeavoring to save the two vessels, now in process of construction, and succeeded in doing so. The loss is fairly covered by insurance. With the exception of the Craig Ship Building Co. at Toledo this was the only plant of importance on the great lakes not controlled by the American Ship Building Co. The works will undoubtedly be rebuilt. The Jenks company has not been altogether satisfied with conditions at Port Huron and has talked of moving its plant to some other point. What effect the fire will have on this score is not yet known.

At the last meeting of the Lake Carriers' Association in Detroit, Capt. Thomas Donnelly of Kingston, whose interests are with companies insuring Canadian vessels on the great lakes, promised to do all in his power to have the Canadian government change its navigation rules on the lakes so as to have them conform with the White law, under which all vessels of the United States on the lakes are operated. He is keeping his promise. The Montreal Star says: "If Capt. Donnelly of Kingston correctly describes the navigation rules on the great lakes, the situation is most dangerous. Canadian and American vessels using the same waters are guided by altogether different rules. For instance, he says, the signal of an American boat in a fog is three blasts of a whistle, while that of a Canadian boat is one long blast, whereas American boats use one long blast as a passing signal. This is a matter which it should be easy for our government to set right. If an agreement cannot be arrived at with the United States for a change in the American rules it would be better for Canada to adopt the American rules as they stand than to have different regulations. The Grand Trunk Railway, under Mr. Hays, made a complete change in the rules for running trains, adopting the American system. If he had kept the old system in force the trains running west, while inaugurating the new system for trains running east, it would not have been very much more absurd than to have two sets of regulations for Canadian and American vessels on the great lakes."


WORLD'S PRODUCTION OF PIG IRON 1900
Statistics by THE AMERICAN IRON AND STEEL ASSOCIATION. AND OTHERS
Designed and Copyrighted by R.G. BEKER, NEW ENGLAND BLDG. CLEVELAND, O.
ITALY
SPAIN
SWEDEN
BELGIUM
AUSTRIA
FRANCE
RUSSIA
GERMANY
GREAT BRITAIN
UNITED STATES
ALL OTHER COUNTRIES
TONS
FURNACE CAPACITY of PIG IRON PRODUCING COMPANIE'S
PENNA. STEEL
NATIONAL TUBE
VIRGINIA I.C.&C.
REPUBLIC I.&S.
AM. STEEL & WIRE
JONES & LAUGHLINS
TENNESSEE COAL
NAT. STEEL
FEDERAL
CARNEGIE
5 5 14 7 11 5 20 19 21 19 FURNACES
YEAR 1810 '20 '30 '40 '50 '54 '55 '56 '57 '58 '59 1860 '61 '62 '63 '64 '65 '66 '67 '68 '69 1870 '71 '72 '73 '74 '75 '76 '77 '78 '79 1880 '81 '82 '83 '84 '85 '86 '87 '88 '89 1890 '91 '92 '93 '94 '95 '96 '97 '98 '99 1900 '01 YEAR
TONS
TOTAL PIG IN THE U.S.
PIG IRON IN GREAT BRITAIN
BESSEMER PIG
PIG IN PENNA.
CHARCOAL PIG.
ALA.
ALL

The figures in the shaded part of the chart show the cost of pig iron and the number of furnaces in blast during each year.

This chart was prepared by R. G. Beker, New England building, Cleveland, from whom copies of the original on a much larger scale may be had at $1.00 each.

VOYAGES FROM LAKES TO EUROPEAN PORTS.

Chicago newspapers are very much interested in four steel freight steamers of 256 ft. length, 42 ft. beam and 26½ ft. depth, which are being built at the works of the American Ship Building Co. in that city for Charles Counselman and others, who propose to operate them in direct service between Chicago and European ports. The launching of these vessels has started a discussion regarding the first vessels making the voyage direct from a European port to Chicago. It was claimed a few weeks ago that the Skjöldmön, a Norwegian vessel which arrived in Chicago in 1863, was the first ship to reach that port from a European country. Later the son of a Chicago pioneer discovered that the Sleipner, also Norwegian, had preceded the Skjöldmön by nearly a year. Andreas' History of Chicago gives the Skjöldmön as the first, but now it is claimed this is an error. R. B. Wilcox, assistant city engineer of Chicago, has hunted up a copy of the Chicago Magazine of August, 1857, which shows that the Madeira Pet considerably antedated the other two. The magazine contains a picture of the vessel.

"According to the log of the Madeira Pet she left Liverpool April 24. 'July 14 at 8 a. m. off Chicago harbor; sailed up channel and came to at North Pier,' thus consuming eighty days in the trip, only thirty-four of which were taken to reach Montreal, but owing to the detention on the Welland canal, to adverse winds and calms she was forty-five in making the passage to this port. Under ordinary circumstances not more than five or six days would be consumed in the passage from Montreal here."

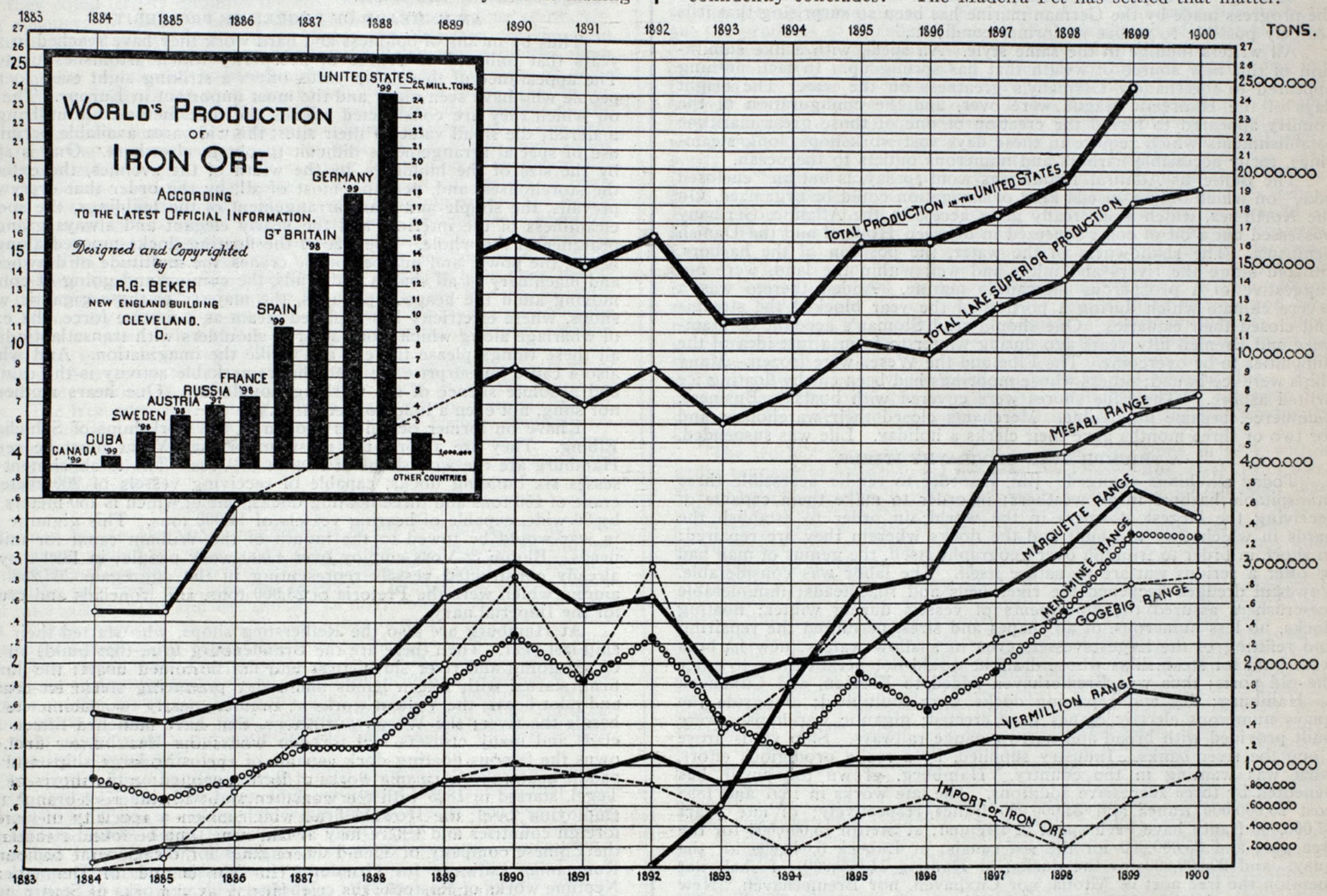
The editor indulged in jubilation, and he had no doubt that this was but the beginning of an important direct commerce with Europe, for he added: "Vexatious delays occurred to her which will not interfere hereafter with the trip of foreign vessels to our port."

The illustration was made from a photograph by Alschular & Florence, though photography was in its infancy. The picture shows the Pet to have been a two-masted vessel of moderate size. The schooner was commanded by Capt. Crang, "a noble specimen of the Scotsman, who was received with great courtesy and hearty cheers by the Chicago Board of Trade." The captain told Chicagoans that no accident had occurred to mar the trip, and he expressed the opinion that a much larger vessel could be brought through to Chicago. He announced, too, that "he was building a large craft, which, 'God willing, he would bring to our waters next season.'"

The editor cannot resist the temptation to crow at the expense of the pessimists, and he does not lose the opportunity to boast of the forwardness of American enterprise. He is delighted over the arrival of the Pet, which sustains his prophecy of commercial greatness, but at the same time he patriotically points out that the "noble Scotsman" was second in the race. He declares the first vessel from Chicago to Europe had sailed from Chicago during 1856, and he gloats over the achievement in this fashion: "As was to be expected, Yankeedom was ahead in this matter. It has been duly chronicled that last year Capt. D. C. Pierce successfully navigated the schooner Dean Richmond from Chicago to Liverpool; that the owners are well satisfied with that venture and sanguine that such undertakings will prove remunerative, but that was looked upon as only the American side of the question. The safe arrival of the Madeira Pet may be considered as the European demonstration."

Even at that early day there were Chicagoans who did not hesitate to predict that the city "must in a few years rival in extent and importance New York city itself," but the editor hedged by speaking of it as a "reckless claim." Chicago had an estimated population of 150,000. When it was proposed to send the Dean Richmond to Europe as a pioneer in the ship trade between Chicago and the old world there was a "plodding portion of the community" that looked upon the projectors as "visionary enthusiasts." "Discouraged but not disheartened," the enterprising backers of the Dean Richmond "laid her course for Liverpool, where, amid the warmest wishes of her capitalists and merchant princes, she soon arrived." The skeptics insisted that it was only a case of Yankee luck, and declared Englishmen would not engage in such a trade, which gave the editor a chance to counter in this manner: "The Madeira Pet has given the broad denial to this. Those sanguine souls have gladened their eyes by an inspection at their own doors of an English vessel, English manned and officered, with an English cargo, cleared from England's greatest metropolis direct for Chicago, her merchandise consigned to our Chicago market for sale. And they, too, will receive a reward of dollars for their foolhardiness."

According to the magazine, the "all-engrossing topic in monetary circles" in Chicago was the question of direct trade with Europe, and he confidently concludes: "The Madeira Pet has settled that matter."



This chart was prepared for Pickands, Mather & Co. of Cleveland by R. G. Beker, New England building, Cleveland, from whom copies of the original on a much larger scale may be had at $1.00 each.

MR. A. B. WOLVIN AT THE HEAD OF ANOTHER ENTERPRISE.

In connection with the failure of W. J. Conners of Buffalo to carry out certain undertakings for the construction of elevators and warehouses at Montreal, it is announced that the scheme has been taken up by Mr. A. B. Wolvin of Duluth, and that he is at the head of a syndicate which seeks to erect two elevators in Montreal harbor. Mr. Wolvin has already had two or three conferences with the harbor board at Montreal and with the Dominion officials at Ottawa. It is understood that his proposition includes terminal facilities other than grain elevators, and the operation of a fleet of steamers upon the great lakes and the Canadian canals from the lakes to Montreal. The elevators are to cost about $2,000,000 and about $1,500,000 is the amount said to be fixed for the acquirement of vessels. The harbor commissioners are represented as being favorably impressed with the proposition, as Mr. Wolvin already is in touch with or in control of a fair share of the lake trade and is in position to bring it to tidewater by the St. Lawrence canal route if he so desires. The harbor board has been asked to guarantee the bonds for the construction of the terminals at Montreal, holding the property as security.

A chart of Agate and Burlington bays (Two Harbors) has just been issued and may be had from the Marine Review at 20 cents. As the district covered is small, the chart is on a large scale and shows clearly all the docks at Two Harbors. It is valuable also as a chart covering a part of the north shore of Lake Superior that is most visited by the ore and coal carriers.

Pig iron is still advancing in price and the market is now up to a basis of $16.50 a ton for Bessemer in the Mahoning valley.

SHIP BUILDING RESOURCES OF GERMANY.

THE FULL TEXT OF M. EDOUARD LOCKROY'S REMARKABLE LETTER ON THE MERCHANT MARINE OF GERMANY—WONDERFUL INDUSTRIAL GROWTH OF THE NATION.

The New York Sun has secured a translation of M. Edouard Lockroy's remarkable letter upon the growth of the merchant marine and ship building resources of Germany, a brief mention of which has already been made in the Review. M. Lockroy was formerly minister of marine in France, and he speaks therefore with considerable authority. The letter appeared originally in the Temps. It is both interesting and important to the people of the United States and reads as follows:

The development of the German merchant marine has been spontaneous and formidable. A few years back that marine scarcely existed. Today it is the second in Europe. It even rivals the English marine. Two revolutions have produced this result: One an industrial revolution, viz., the revival of the German empire. It is chiefly since 1870 that its development has been extraordinary. Its present prosperity fills with admiration and wonder the Germans themselves. Mr. Robert Sloman writes:

"Though the impressions of my childhood and youth are very keen the progress made by the German marine has been so surprising that it is scarcely possible to realize its former condition."

All writers indulge in the same style. All speak with a like admiration of this new source of wealth that has sprung up. In fact, nothing appeared to foreshadow Germany's greatness on the seas. The bright days of the Hanseatic league were over, and the configuration of the country appeared to forbid the creation of one of those great maritime establishments which require in these days vast workshops, long steamships, easily accessible harbors and numerous outlets to the ocean.

The Baltic, as Admiral Tirpitz was wont to say, is but an "enclosed lake," on which only a special kind of navigation could be organized. On the North sea, which alone really gives access to the Atlantic, Germany possessed but a bit of coast squeezed in between Holland and the Danish peninsula. The shallowness of the water, the position of the harbors, situated along the rivers and inlets and well within the land, were not suggestive of a prosperous mercantile marine. Added thereto was a severe climate which during a portion of the year blocked the streams and closed their estuaries. One should read Sloman's account of Hamburg and Bremen fifty years ago during winter to form a just idea of the difficulties to be overcome. The Elbe and the Weser were frozen. Many ships were ice-bound; others whose moorings had been cut by floating ice drifted ashore. "The Elbe shores were covered with boats." Business, commerce, became impossible. Merchants closed their warehouses and for two or three months gave their clerks a holiday. Life was suspended.

A TRIUMPH OVER GEOGRAPHY ITSELF.

Today all this is changed. But, in order to render accessible these inhospitable harbors in all weathers; in order to make them capable of receiving the largest steamers in the world; in order to establish the yards in which they are built and the docks wherein they are repaired; in short, in order to triumph over geography itself, the genius of man had to offer a serious warfare to nature itself. The labor was considerable. Powerful dredges deepened the river beds and roadsteads; innumerable ice-crushers assured the movements of vessels during winter; floating docks, no less numerous, of all shapes and sizes, permitted the repairing and refitting of the largest vessels even in shallow waters; new harbors were built for steamships whose draught would not permit them to enter the old ports; thus was Bremerhaven added to Bremen, and Cuxhaven to Hamburg; dry and repairing docks were multiplied; alongside the quays numerous electric cranes were erected; gigantic warehouses were built provided with broad and narrow gauge railways. Ship yards arose along the river banks. Industry supplied, by a really prodigious effort, what was wanting in the country. Hamburg, grown too small, has benefited by three successive additions. The late works in 1897 and 1898 cost 20,000,000 francs and 34,000,000 francs respectively; of late years 37,000,000 francs have been spent at Bremen; at Stettin 15,000,000 for the free port and 35,000,000 for the sea canals; at Lubeck 6,000,000 for the quays, and 20,000,000 for the docks; at Dantzig 11,000,000. I shall not mention the free port of Altona, nor Cuxhaven, nor Bremerhaven. New works are projected which will cost still vaster sums. There has not been even a momentary relaxation; at the mouth of each river it is proposed to build a port.

Some figures will convey an idea of this surprising development. In 1870 Germany possessed only seven private ship yards. She had eighteen in 1880, twenty-five in 1890. Today she possesses thirty-nine. In 1870 the seven yards employed 2,800 workmen. The thirty-nine of 1901 require 37,850 hands. I do not reckon herein the number of work people in accessory trades—metallurgy, cabinet making, leather, stuffs and others would raise the figure to 90,000. These ship yards are prosperous. The consumption of iron for ships of over 100 tons in 1890 reached 45,900 tons. In 1899 it had risen to 85,500 tons. These yards yield dividends of 12 per cent., 13 per cent. and 14 per cent. Their managers pretend to be the first constructors in Europe. In support of this boast they state in the Dresden International Review of Armies and Fleets that the naval attache of the United States in an official report to his government recommends the Washington cabinet to replace the voyages of instruction of naval constructors and American officers to England and France by voyages to Germany, "which country at the present time is in the first rank in the art of naval construction."

ENGLISH TRADE IS EXPERIENCING A CHECK.

It is difficult to decide if this boast be well founded. What is certain is that German ship building is damaging the English trade. The latter is experiencing a check, while the German is moving onward. At the beginning of 1899 the total tonnage of vessels in construction in England reached 1,385,000 tons; at the beginning of this year it had dropped to 1,260,000 tons. Germany has absorbed the difference. Such a state of things has caused alarm in the English press. They attribute it to the cost of construction, which, in their opinion, is too high "to afford a profit at the actual rates." They likewise blame the high price of coal and raw material. But whatever may be the cause they acknowledge the fact. Of the thirty-nine German yards five can construct the largest ironclads, five the largest transatlantic liners, nine cruisers of all kinds, fourteen passenger, merchant and cargo ships. By their powerful machinery and sheltered situation they offer invaluable facilities for repairing and refitting fleets in war time. The enemy can neither annoy nor shell them, established as they are within estuaries and up riverways. German mines supply them with coal, the best factories of Europe furnish them with iron and steel. Krupp alone, in one year, can let them have 11,000 tons of armor plate. They are cheaply built on almost waste ground; they lack neither space nor ground in and on which to extend their industry.

Helped, encouraged, favored by the government, which, in their interest has suppressed entry dues on all material for naval construction, they have laid themselves out to adopt every improvement to develop their machinery, to recast and amend it, sometimes cutting down their shareholders' dividends in order to succeed, as they say in their reports, in making the German ship yards "the first, not only on the continent, but in the whole world." At the same time they have undertaken to build both warships and merchant vessels; to their home orders the activity of their agents has added foreign orders; they have constructed for China, Japan, Russia, Italy, South America, for almost every country which has a marine and ships. Starting from the well-founded view that the larger the ship the less the proportionate cost of maintenance, they have launched one after another those enormous steamers which cross the Atlantic at an average of twenty-two knots.

AN UNHEARD OF DEGREE OF PROSPERITY.

Thus by means of boldness and hard work they have reached in a few years that unheard of degree of prosperity which astonishes us today. The appearance of these ship yards offers a striking sight even to those people who have seen many and the most important in Europe. The plan on which they are constructed affords the best method for utilizing the material; the small value of their sites, the wide area available permit the use of special arrangements difficult to obtain elsewhere. One is struck by the size of the buildings, by the width of the avenues, the extent of the storehouses, and, perhaps, most of all, by the order that everywhere prevails, the simple and plain arrangement of the buildings, the spotless cleanliness of the interiors and the nearly elegant and always grand appearance of the whole. The size of the floating docks moored along the banks, the power and number of the cranes, the multitude of drawbridges and machinery of all shapes and kinds, the coming and going of convoys moving amid the heaped up goods, the majesty of these gigantic workshops, where electricity has replaced steam as a motive force, the extent of wharfage along which ironclads rub shoulders with transatlantic liners, all these things please the eye and strike the imagination. And what is also a cause for surprise amid all this remarkable activity is the calmness and absolute silence of the working population. One hears neither cry nor song, not even a loud conversation.

I have on former occasions spoken of the workshops of Schichau at Elbing. They are among the most important. What must be seen at Hamburg are the workshops of Blohm & Voss. The establishment possesses six building docks, capable of receiving vessels of 200 meters, a crane of 150 tons and three floating docks, one of which is 150 meters long by 36 wide, capable of bearing vessels of 14,000 tons. This gigantic dock in war would be towed to the mouth of the William canal for military needs. Blohm & Voss employ over 4,000 work people; in 1899 they had already constructed vessels representing in the aggregate 262,258 tons, among which were the Pretoria of 23,000 tons, and ironclads and cruisers for the Imperial navy.

At Hamburg are also the Reiherstieg shops, who started their 430th ship last year. Then there are the Brandenburg firm, that builds all sorts of sea-going and river ships, tugs and flat bottomed boats; the Janssen firm, started with fifteen hands and today producing steam ice-crushers and pilot boats; the Vulkan works at Bremen, nearly two kilometers long beside the river; the Weser workshops, that have launched fifteen ironclads and many cruisers and torpedo boats; the Hensburger firm, that owns the famous floating dock capable of enclosing large ships and even paddle boats; the Germania works of Berlin, erected on the shores of Lake Tegel, started in 1825 with ten workmen and with the Kiel branch today employing 2,000; the Howald firm, which makes a specialty of work for foreign countries and where may at the same time be found steamers for the Chinese company of Tien-Tsin, engines for the General company of Roumanian railways, for Honduras, for Russia and for Denmark; the Neptune works of Rostock; the celebrated Vulcan works of Stettin, which cover twenty-five hectares and employ over 6,000 workmen, and from which proceeded above all the immense Atlantic steamers, including the Deutschland, 205 meters long and of 33,000 H.P.; the Oderwerck yard, and finally the Germania works at Kiel, which when finished in 1904 will be able, according to Mr. Hamm, to build at the same time twenty of the largest warships and a dozen torpedo destroyers.

Shall I add that besides ships these works also construct cranes, boilers, pontoons, machinery and locomotives? They are thus able to keep their men employed when ship building is slack. Such a development of naval construction sufficiently indicates the power of the merchant marine. But in order to gain an accurate knowledge one must visit Hamburg and Bremen. The sight is worth the trouble.

IMPORTANCE OF HAMBURG AS A SHIPPING PORT.

Of late years Hamburg has become a more important port than Liverpool, both as regards tonnage and number of ships entering. It is an immense labyrinth of canals, basins, rivers, where one who has not passed his life among them is lost, where many of the townspeople would be unable to find their way. The time-worn metaphor "a forest of masts" becomes here a reality. This forest rises above the stream enveloped in black smoke and white steam. It hides the landscape. Vast as they are, the quays are insufficient, and vessels are moored to large piles bound with iron hoops. These piles are called, for some unknown reason, Dukes of Alba. The harbor has become too small for the crowd of sailing ships and the multitude of cargo boats. All kinds of small boats flit among these international fleets, more swarming and crowded than are the cabs in the Paris boulevards. Above the river banks one perceives here the old houses of the Hanseatic town, their enormous stores, docks, coal depots and electric cranes at work. The movement is continued, perhaps even increased, in the canals which are encumbered with flat-bottomed boats, crossing and passing one another as though in an industrial Venice, between brick buildings from whose windows bales of merchandise are descending by means of ropes and pulleys. There, too, as in the ship

yards, absolute silence reigns. Porters, boatmen, sailors speak in low tones. Neither oath nor cry is heard.

When I visited Hamburg one single ship, alas, amid all those thousands, displayed the tri-color at the main. She belonged to M. Cellier, a German of the Edict of Nantes. In memory of his descent, M. Cellier gives to our country and our countrymen immense services that have never been rewarded. Some figures, better than all description, will give an idea of the importance of Hamburg. Thus 307 sailing ships are registered as belonging to Hamburg and 486 steamers. The first represent 240,419 tonnage and the latter 748,435 tons. The steamers for Hamburg firms on the stocks at the beginning of 1901 number thirty and represent 166,460 tons. Inward and outward bound vessels together reached in 1899 the startling figures of 26,648 ships, or 29,424 if we include Altona and Harburg, which are in fact suburbs of the town. French vessels scarcely make up 1 per cent. of these. Perhaps almost as interesting as the seaport is the riverport. Here, too, is to be seen a fleet, but a fleet of flat-bottomed boats which, by means of the canals and rivers, distribute merchandise throughout Germany and even as far as Russia. Sometimes these boats are of very considerable size. Some can carry 1,000 tons freight. It is this kind that is employed in quite a new and interesting form of navigation with the Baltic ports.

With that practical spirit so noticeable in all they do, the Germans found they could largely diminish the cost of transport if, instead of chartering steamers or sailing vessels, they succeeded in sending across the sea flat-bottomed boats with a tug. Commerce between Sweden and Germany is considerable, and the width of the Baltic which divides them did not appear to offer an insurmountable obstacle to this style of navigation. Accordingly boats were constructed similar to those used on the rivers. But care was taken to deck them with sheet iron similar to the shell of a tortoise, thus making them absolutely waterproof. Thus protected from the waves, being a sort of well shut floating boxes, they succeed, without too great a risk, in going forward and backward between the German and Swedish ports. This economical system of commerce is now very flourishing. Many such boats ply across the Baltic drawn by tugs, with a single man at the helm. Sometimes, however, bad weather comes, tempests arise, towing becomes difficult, dangerous, even impossible. In such a case the tug does not hesitate; it cuts adrift, and abandons its charge. The steerer of the forsaken boat goes below, closes the hatchway, and buffeted by the waves in his box he patiently waits till the fury of the elements has subsided. As soon as is possible the tug goes in quest of him, finds him, passes him the line, and together they proceed on their interrupted journey.

One of the reasons that have most contributed to the development of the merchant marine is the creation of free ports in all the maritime towns. The free port of Hamburg, closed landward by a simple railing, occupies itself almost all the space available. The harbor, properly so-called, is reduced almost to nothing. It is the same elsewhere. Handsome red brick buildings with green copper roofs house the customs and executive authorities.

IMMENSE DOCKS AT BREMEN.

Bremen is also one of the handsomest of the German ports and one of those most visited by vessels. It contains the largest dock in Europe. This dock is 2 miles 300 meters long in a straight line. On either side it is bordered by two rows of stores and railways. The electric cranes rise at stated intervals to right and left and are as numerous as lamps in a Paris street. Large, however, as it is, the dock has become too small. A new one is to be begun of the same dimensions, and is to be finished in three years. The commercial fleet is quite as interesting as the ship yards. The various companies that have in turn been formed to organize a regular traffic on the Baltic and the ocean have done good business. Within a short space of time they have considerably increased their staff and their plant. Today they can maintain the fight against the big English and American companies.

One of the richest and best known of the steamship companies is the Norddeutscher Lloyd. Started in 1857, with only three vessels that made trips to England, it was already in communication with America in 1870. Its ships, favored by night, then ran the blockade of the French squadron and reached New York by doubling the north of Scotland. Since then it has steadily increased. Today the company owns eighty-four steamers of 410,000 tons and employs 6,000 sailors. After it I shall merely indicate the Hansa Co., which competes on the Indian route with Liverpool, and sixteen or seventeen other Bremen or Hamburg companies in order to arrive at the most important of all the Hamburg-Amerika. The early days of this company were days of difficulty. It was only shortly before 1870 that it began to soar. Fifty-one years ago it began with four sailing ships. At present it works fourteen lines of navigation for North America, South America, India, China, and Europe, and its enormous steamers, models of which were at the 1900 exposition, compete in speed on the Atlantic with those of the Norddeutscher Lloyd. It is not only the regular lines that prosper. The German marine spreads itself throughout the world, it shows its flag in all seas. A fact, not well known, I think, will give an idea of its expansive power. From six to seven hundred German coasters trade today between India, Japan and China. It is quite an Asiatic fleet which Europe never sees. Little by little it is winning the trade of the far east.

FOLLOWING THE SUGGESTION: "OUR FUTURE LIES ON THE SEAS."

Seventy per cent. of the total trade of Germany is done by sea. The value of Germany's merchant fleet is reckoned at 625,000,000 francs. Within the last four years it has increased 66 per cent. Within this same period the commerce with France has doubled; since 1894 it has doubled with Africa, Australia and North America. The large steamers from Hamburg and Bremen come now to our own ports—to Cherbourg—to take from our transatlantic liners freight and passengers. I shall say nothing of the French mercantile marine. M. J. Charles Roux, in the fine book he has written on the subject, had drawn its sad picture. One can say neither more nor less. But if France sees her marine decaying it is somewhat because she neglects it; and if Germany obtains unlooked for success, it is because, with invincible resolution and extraordinary energy she works to extend her trade and conquer foreign markets. She has learned that it is abroad that civilized nations must now seek for new sources of wealth. That idea the emperor expressed when he said: "Our future lies on the seas." Therefore every one set to work. Commercial travelers, the most capable and thorough going on the continent, have overrun the universe; bankers have everywhere established themselves, at Shanghai as at Buenos Ayres; husbandmen have colonized Palestine; big companies have created steamer lines on the Yangtse; schools have been established "for the propagation of the German tongue." Finally the pupils of the official school of Oriental languages have set before them as an exercise in translation into Japanese and Chinese the prospectuses of all big industrial undertakings. These efforts have borne fruit. Germany has shown herself more to be feared in peace than in war. H. Heine's prophecy has come true: "Beware!" said he to the nations of Europe, "you have more to fear from a freed Germany than from Cossacks and Croats."

THE WORLD'S SHIPPING.

The Manufacturer's Record has published a little article which is not only a good epitome of the ocean's transportation facilities, but an excellent plea for the shipping bill as well. In part it reads as follows:

The maintenance of the balance between production and consumption has long been hampered by a lack of or very limited powers of distribution. The modern merchant marine is doing away with this deplorable condition. Railroads and ships, steam and sail, have made it possible for the farmer, far inland in Kansas, Nebraska and Wyoming, to sell his cereals in the centre of Europe or Asia. The same powers have put the products of Carnegie, Krupp, McCormick and of other factories out on the farms. Not only have the facilities of distribution been increased, but very much cheapened. This cheapening of freights has influenced the prices of cereals in European markets, making the lot of farmers anything but a happy one. It has helped England and Europe very materially in industrial development. Germany owes to it and to the wonderful increase of her great shipping lines the unprecedented prosperity of the last twenty-five or thirty years. Freight rates on coal (between England and Buenos Ayres) went down from $9.73 in 1874 to $2.43 in 1900. Rates to Rio de Janeiro from $6.30 to $3.41; to Alexandria, Egypt, from $4.38 to $1.70, to Odessa, on the Black Sea, from $4.26 to $1.58. The rates between England and other parts, noteworthy between Canadian and English ports, were very much reduced, during the same period. The rates, for lumber, between Quebec and England, were $21.42 in 1874 and $4.62 in 1900, for boards, $25.55 in 1874, $9.72 in 1900. Rates ran up a little toward the end of last year; but nothing to note and certainly not enough to disturb the tendency of prices downwards. The movement was due to the very great demand for transportation caused by the drawing off of ships to transport troops, munitions of war, etc., etc. All this is due to improved methods of building and running ships. The carrying capacity of ships, according to careful estimates, has been increased fully one-third by putting in triple and quadruple expansion engines.

The world's steam tonnage went up from 5,865 ships, in 1874, with a gross tonnage of 5,226,000, net 3,471,000, to 12,289 ships, 21,787,000 gross, and 13,465,000 net tons, in 1900. The number of steamships has more than doubled in twenty-six years. Sailing vessels show a falling off. There is a tendency, here, at least, in the United States, to build big sailers. A seven-master 335 feet long and something like 4,000 tons is being built in a ship yard in Maine.

There were 56,289 wooden ships, in 1874, with 14,523,000 registered tons; today (1900) there are 27,982, with 8,205,000 tons. Since 1874 the world's transportation facilities have increased two and a half times. The relative position of the different powers is full of interest. At the end of the century England led with 11,859,000 steam and 2,513,000 (total 14,362,000) sailing tons; Germany came next with 2,169,000 tons, steam, and 551,000 tons, sail; total 2,720,000 tons. We were third with 1,183,000 tons, steam, and 1,360,000, sail; total, 2,543,000; Norway followed with 769,000 and 898,000, steam and sail respectively; total, 1,667,000; France was fifth with 1,060,000 steam and 341,000 sail; total, 1,401,000. England has more than half the world's steam tonnage. Not only is this true, but up to quite recent years the island empire built most of the steam ships used by other countries, even Germany buying almost all the ships of her Lloyd and other lines in Belfast, Glasgow or English yards.

In the last ten or fifteen years Germany has been building her own ships. They are record-breakers and record-makers. The Deutschland, Kaiser Wilhelm der Grosse and other boats launched by the Hamburg and Bremen lines, lead all others, even the Cunarders, and White Star ships. The record of Germany, in ship building, in recent years, reads like romance. The empire has been helped marvellously in its industrial efforts; also in its efforts to secure foreign markets by the men who made the new ships. When the Deutschland rode into Southampton harbor covered all over with the words "Made-in-Germany," England's efforts to engine the empire in its efforts to find favor in England and foreign fields were answered.

At the end of 1900 the following nations were represented in ship building by the figures set over against each:

Country.	Steamers. Tons.	Sailing vessels. Tons.	Total tons.
Great Britain	1,192,000	12,000	1,204,000
United States	142,000	13,000	153,000
Germany	147,000	5,000	152,000
Italy	103,000	1,000	104,000
France	63,000	55,000	118,000
Holland	26,000	8,000	34,000

These tables and facts tell a very significant tale. If we are wise we will heed and take to heart the lesson they teach. The possibilities before our people are infinite. It is too bad that they have been seemingly so long neglected. Much may be done to amend for the past. The time to do it is today; not tomorrow. The tomorrow nations, like tomorrow men, never accomplish anything. Our country is entering upon a commercial career beside which the days of the Baltimore clipper and the barks of Boston, Salem, Beverly and other old-time shipping centers will be what the toy-ships of boys on Boston common, or the parks of Baltimore were to the big ships of the past.

Megaphones, used so extensively on vessels, are a specialty with Merriman Bros. of 162 Commercial street, Boston, who will gladly furnish information as to sizes, prices, etc.

MARINE REVIEW

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Information from New York is to the effect that the success of the United States Steel Corporation is now assured by the deposit in the various trust companies of the required amount of stock of the constituent companies in exchange for the stock of the steel corporation. The merger of these gigantic interests has been accomplished without any perceptible effect upon the general market, which is due to the fact that very little actual cash has been required in the deal. The great consolidation is really more of a community of interest than it is a trust. It is the general belief that the constituent companies are quite likely to continue their operations in the future as they have in the past, with the exception that duplication of plants will be abandoned and that in their output each will have regard for the natural market of the other. There is no question but that the consolidation has averted a disastrous steel war. Indeed, that war was on the verge of being declared. There should be no fear that the great corporation will make undue exactions from the consumer. Such a policy would be suicidal, for the list of formidable steel companies outside of the corporation is a long one. Indeed, the consolidation is likely to be of direct benefit to the consumer, since by its economies, particularly in the saving of freight by the division of its market, it can lay steel at the consumer's door at a lower cost than ever. In these latter days the policy is to do a big business at a small profit rather than a small business at a big profit, and the corporation will doubtless emphasize this modern principle more than ever. The country has nothing to fear from the great corporation. With its mines, railways, vessels, docks, furnaces and mills the corporation ought to supply the United States with good steel cheaply, simply because, being bounden to no one for any part of its raw material or its transportation, it can produce steel cheaply; and, moreover, with these advantages it ought to be able to capture a fair share of the world's trade. It ought to be a good thing for the country on account of its ability to supply the country's needs at a reasonable price, due to low cost of production, but more particularly on account of its ability to seek the markets of the world. It ought to be a good thing for the shareholders, owing to the elimination of needless expenses which can now be applied to dividends. The corporation has behind it those great administrative minds which have made the United States the commercial and industrial wonder of the world, whose names have spelled success in so many ways and so many times that through mere force of habit they could not spell anything else.

For powers of analysis, for pure and lucid reasoning, few men are so capably endowed as A. J. Moxham, the general manager of the Dominion Iron & Steel Co., Ltd. A remarkable address which this remarkable man delivered before the Cleveland Chamber of Commerce a few years ago is still fresh in the minds of Clevelanders. He was discussing the logical steel making center and he fixed it on the south shore of Lake Erie. The evidence of its practical quality is to be found in the excellent plant at Lorain, now a part of the Federal Steel Co., or to be more up to date, the United States Steel Corporation. Mr. Moxham has now rendered the same service to Canada that he gave to Cleveland. He has fixed upon its logical steel making centers. His address before the Canadian Manufacturers' Association at Toronto is a masterpiece. If Moxham were not a great steel maker he would be a great writer. His language is as limpid as water and as clear as crystal. He is alive to the fact that Canada is in her industrial renaissance. Her home market is growing. The cry for steel is becoming louder and louder. Steel is the one commodity which does not keep an even pace with the growth of population. It grows by geometrical progression. Give a town twice its population and its demand for steel has quadrupled. The silent tide of immigration pouring into Canada is hungry for steel. The farmer wants plows, wire fences and what not, the artisan wants tools, the blacksmith, the wagon maker, the ship builder want steel—in short, the demand is incisive, insistent and constant. What is steel? Ore, coal, limestone and labor. Its cost is regulated by the cost of these materials; and the cost of these materials is regulated by the cost of their assembly. Mr. Moxham makes calculations which it is difficult to disprove that for the central Canadian district, which includes Ontario, raw materials can be assembled more cheaply at Sault Ste. Marie than anywhere else on earth. He makes the same calculations for Sydney in its relation to the export trade. The figures which he presents are not the figures of a theorist. They are ton-mile rail and water-freight calculations on ore, coal and limestone, based upon a life experience. That people have faith in him is evidenced by the fact that a recent call for stock subscriptions has been three times over subscribed.

GOVERNMENT REPORT ON VESSELS OF THE GREAT LAKES.

A bulletin from the United States treasury bureau of statistics dealing with records in the office of the United States commissioner of navigation presents some interesting figures regarding vessels of the great lakes. The entire commercial development of the great lakes and of the territory contiguous thereto has been embraced within the century which has just closed, and the more interesting phases of it are presented by the record of the past ten years. Prior to that time the growth had been by leaps and bounds, interspersed with periods of depression, and during the five years following 1875, when rail competition first became active, there was a very appreciable falling off both in vessel tonnage and the volume of freight traffic.

Taking up first the accessions to the vessel tonnage engaged in the carrying trade on the inland seas, it may be noted that never prior to 1890 had the lake tonnage reached an aggregate of 1,000,000 tons. In that year the aggregate tonnage was 1,063,064 tons, and from that time until the present day an almost steady increase has been noted. Never since 1889 has the total dropped below the 1,000,000 mark, and with the single exception of 1894 there has been no year wherein the tonnage sum has not shown an increase over the preceding twelve months. The minimum yearly increase during the decade was 14,059 tons and the maximum 86,035 tons, the latter having been recorded in 1897, while the year previous has a gain of 82,608 tons to its credit. The aggregate tonnage on the lakes at the close of the last fiscal year (June 30, 1900) was 1,565,587 tons, a gain of 502,524 tons, or 32 per cent., during the interim covered by the comparison.

It may be of interest to digress for a moment at this point to consider the relation of the lake fleet to the vessels of all kinds owned in the United States. In 1891, for instance, when the aggregate tonnage under the American flag was 4,684,759, the tonnage of the lake craft amounted to 1,154,870 tons, or over 24 per cent. The aggregate tonnage for the nation increased very gradually prior to 1900, and thus in 1896 and 1897, when heavy additions were made to the complement of fresh water carriers, the shipping of the inland seas represented as high as 29 per cent. of the whole. According to the latest statistics compiled by the United States commissioner of navigation, the aggregate burden of American vessels is 5,164,839 tons, and the great lakes, with 1,565,587 tons, thus embraces 30 per cent. Finally it may be noted, for purposes of comparison, that the tonnage of vessels now owned on the Atlantic and Gulf coasts of the United States is 2,727,892 tons, and thus exceeds by 74 per cent. the tonnage on the great lakes.

Taking up the subject of iron and steel vessels exclusively, the great lakes make a much more favorable showing. Of the 1,592,831 tons of iron and steel tonnage in the United States, inclusive of Hawaii, there are on the inland seas 687,769 tons, or 43 per cent. The Atlantic and Gulf coasts have 762,821 tons, or less than 11 per cent. in excess of the lake fleet, as compared with an excess of 74 per cent. when craft of all kinds are taken into consideration. The true significance of the figures indicative of the relative strength of shipping on the great lakes and Atlantic and Gulf coasts is only gained, however, when a comparison of the number of iron and steel vessels in each locality is presented in conjunction with the statements of tonnage. Of the aggregate of 1,225 iron and steel vessels flying the American flag the great lakes has but 322, as compared with 763 on the Atlantic and Gulf coasts. In other words, the inland waterway, with but 26 per cent. of the metal vessels in the American fleet, has 43 per cent. of the tonnage, and whereas the iron and steel fleet owned on the Atlantic and Gulf coasts numerically exceeds that on the lakes by 137 per cent.; in tonnage the excess is, as has been stated, less than 11 per cent. To carry this comparison further, it may be of interest to consider the apportionment of the larger iron and steel vessels—those of 1,000 tons each and over—now operated under the American flag. Of this class of tonnage, out of a total in the United States and Hawaii of 778 vessels of 1,710,136 tons, there are to be found on the great lakes 424 vessels of 911,533 tons. It will thus be seen that the lakes have 54 per cent. of the whole fleet and 53 per cent. of the tonnage. In numerical strength the lake fleet exceeds that of the Atlantic coast and Gulf of Mexico by 151 vessels, or 55 per cent., and in tonnage by 271,381 tons, or 42 per cent.

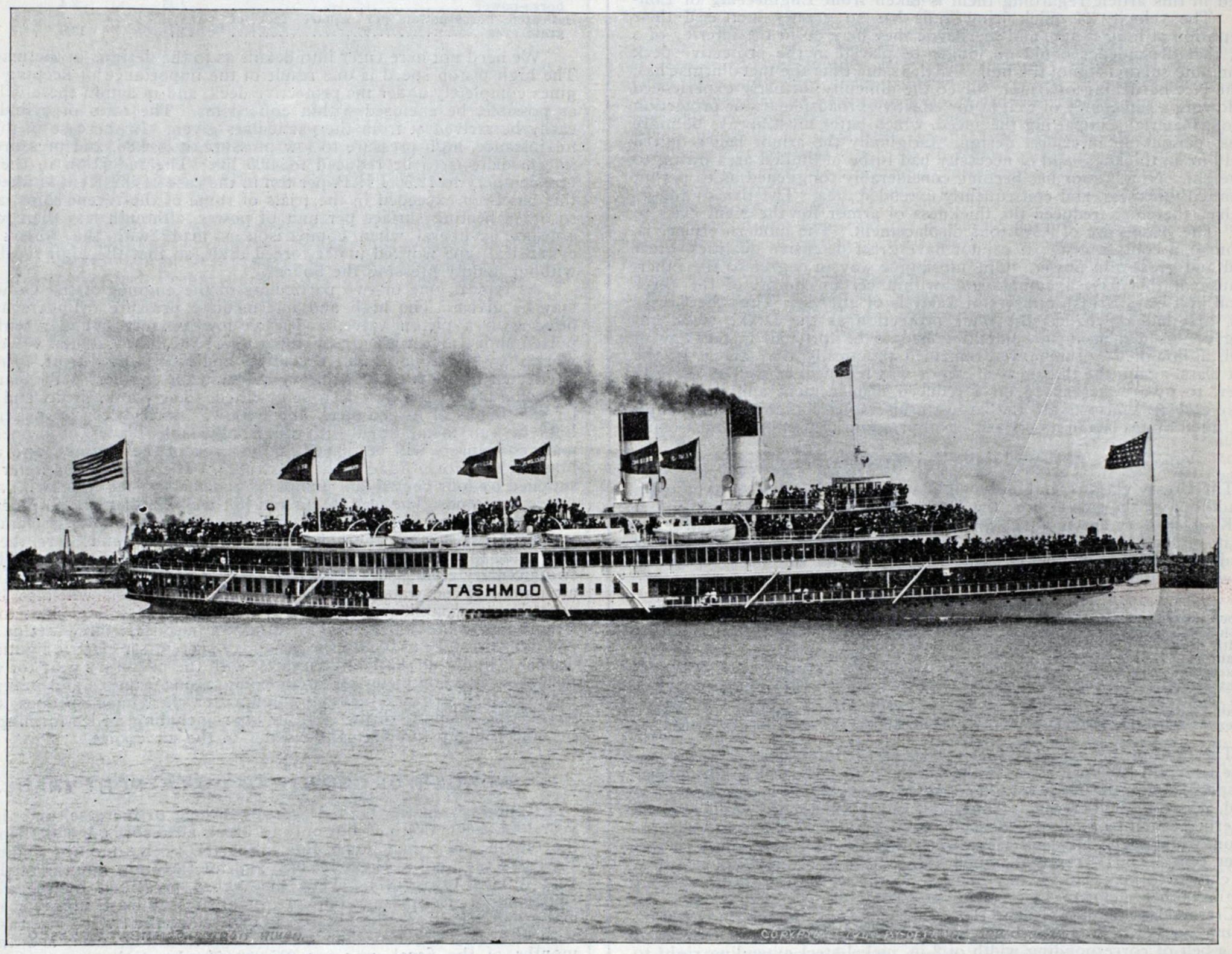
POWERFUL FIRE BOAT FOR MILWAUKEE.

Milwaukee is to have a powerful fire boat, probably the finest craft of its kind in the world. Bonds to the extent of $100,000 have been authorized so as to provide funds for the construction of the vessel. It is quite probable that the new boat will be planned after the Chicago fire boat Illinois, which was designed by Mr. W. J. Wood, naval architect with the Goodrich Transportation Co. Fire Chief James Foley of Milwaukee is very favorably impressed with the Illinois and paid Mr. Wood a very high compliment in his reference to this vessel at a meeting of city officials in Chicago a few days ago. "The Illinois is considered," he said, "from all standpoints—speed, handling in narrow waterways, and amount of water delivered by its pumps when in actual fire service—the most powerful and efficient fire boat in this country, or in the world. Chief Foley also presented a letter from Mr. Wood going into quite a complete description of the Illinois. The Milwaukee officials that will have to do with the letting of a contract for the new boat were authorized to go to Chicago and inspect the Illinois. They will meet Mr. Wood in Chicago about the middle of next week. The party will number about thirteen, including Chief Foley, members of the fire commission, board of public works, chief engineer of the city and comptroller.

It is reported from Buffalo that in view of its intention to run its large passenger steamers North West and North Land between Chicago and Buffalo during the coming season, instead of Duluth and Buffalo, the Northern Steamship Co. has chartered the steamer Miama, one of the Plant line vessels of the Florida district, and will bring her to the lakes about June for service between Duluth and Mackinaw island, connecting at the latter place with the big steamers running between Chicago and Buffalo. The Miami is a twin screw steamer of 1,741 tons gross, and 1,311 net, and is 239 ft. keel and 40 ft. beam, so that she may be readily passed through the canals of the St. Lawrence and the Welland. She was built in 1897. She is said to be capable of maintaining 20 miles speed. She has 150 state rooms and sumptuous appointments.

NEW VESSEL FOR THE WHITE STAR LINE.

Mr. B. W. Parker, general manager of the White Star line of Detroit, closed a contract this week with the Detroit Ship Building Co. for a new passenger steamer which is to be a duplicate of the Tashmoo, famous as fast Detroit-Port Huron excursion boat,, Hudson river like in appearance. This makes three passenger steamers which the Detroit Ship Building Co. must turn out by the opening of navigation, 1902. The other two are the side-wheelers for Detroit-Buffalo service, which are to cost about $650,000 each. The essential difference between the new Detroit-Port Huron boat and the Tashmoo is that the new boat will utilize the beam engines of the steamer Greyhound. The new vessel will be of the following dimensions: 312 ft. in length over all; 300 ft. on the water line; 37½ ft. breadth of hull; 69 ft. breadth over all; 13½ ft. depth, and 8 ft. draught of water. The hull will be constructed throughout of mild steel and will be subdivided by five watertight compartments. In general features the new vessel will closely resemble the Tashmoo. Being designed for a day boat there will be very few staterooms. On the main deck forward of the shafts will be the large saloon with double entrance gangways on each side, and broad stairways of mahogany leading to the lower and upper saloons. Immediately aft of the shaft will be a large lobby, with refreshment room in the forward end. The main cafe will be aft, with an entrance on either side of the stairs. On the promenade deck will be the main saloon, extending about one half the entire length, and on either side will be arranged five large parlors with bay windows. The smoking room will be located on the upper deck and will be one of the distinctive features of the boat. This apartment will be 42 by 23 ft. and will be provided with a glass roof and sides, permitting a fine view in all directions.



Excursion Steamer Tashmoo, a duplicate of which is to be built by the Detroit Ship Building Co.

One of the very capable officers in charge of the branch hydrographic offices on the great lakes says: "Of late we have hundreds of young men, mates, second mates, and even wheelmen and watchmen, calling upon us for information as to how they may best undertake on their own account and in view of their practical knowledge of lake affairs a study of the science of navigation. To these men I do not recommend the higher works on the subject, which they would find very difficult to understand. One of the best little book I know of for them, and it costs only a dollar, is 'Elements of Navigation,' by Henderson. It is a short, simple and yet comprehensive book, on the subject. Other treatises on the subject are of two kinds—first introductory and simple, but incomplete, and second, exhaustive but incomprehensible to the beginner. The aim of Henderson's little work is to instruct the beginner, leading him step by step from the first operations to the perfection of the art. The instructions are terse but clear. Fundamental principles are explained, but no attempt is made to elucidate the higher mathematics of the subject." Henderson's "Elements of Navigation" may be had from the Marine Review Pub. Co.

DETROIT & BUFFALO CO.'S NEW VESSELS.

It is quite likely that the two new vessels for the Detroit & Buffalo Steamship Co., the new organization that is to operate between Detroit and Buffalo, will be known as the Eastern States and the Western States, though these names have not been definitely decided upon as yet. They are regarded as most appropriate. Officers of the new company have been elected as follows: Alexander McVittie, president; George W. Gardner, vice president; W. C. McMillan, treasurer; David Carter, secretary. The two new vessels will be duplicates and can best be described by comparing them with the Cleveland & Buffalo Transit Co.'s City of Erie. This vessel is considered to be one of the finest side-wheelers in the world. The City of Erie has made 30 miles in one hour and ten minutes. Her usual speed, however, is 20 miles an hour. The new vessels will be scheduled somewhat faster than the Erie—or to state it in another way, they will be designed to accomplish with greater ease what the Erie is now doing. The new vessels will be 350 ft. on the water line; 366 ft. over all; 55 ft. hull beam; 80 ft. beam over all; molded depth, 19.6 ft. They will have 250 staterooms and eight parlors, with bath. The Erie has a length over all of 324 ft. and has 210 staterooms. In general interior finish the vessels will resemble the Erie. The real substantial difference is in the engines. The walking beam so familiar in the vessels of the Detroit & Cleveland line and the Cleveland & Buffalo line will be absent in the new vessels. The vessels will be equipped with triple expansion inclined engines, supplied with steam from eight Scotch boilers and designed for 10,000 H.P. Mr. Frank E. Kirby, the naval architect, has persuaded the company to adopt the inclined engine on the representation that for vessels of their dimensions it is more economical than the beam engine—that is, beyond a certain size the beam engine can be supplanted by the inclined triple expansion engine with the advantages of greater power and better distributed weight. Both vessels are to be built at the yards of the Detroit Ship Building Co. and the material for them is now being assembled. Both vessels will be ready by the opening of navigation in 1902 and are to cost approximately $1,280,000. They are scheduled to make the trip from Detroit to Buffalo in thirteen hours and are not to touch at any other port.

A mammoth five-masted schooner is to be constructed at the yards of John M. Brooks, Harbor View, East Boston, Mass., for Capt. A. C. Crandall and others. Her general dimensions are 340 ft. over all, 300 ft. keel, 49½ ft. beam and 30 ft. depth of hold. The vessel will have three flush decks, the poop being 8 ft. She will have considerable auxiliary machinery for hoisting purposes.

Mr. Geo. E. Hubbert, 123 North Fourth street, Philadelphia, has been appointed special agent in that city for the sale of the Ashton pop safety valves and steam gauges made by the Ashton Valve Co. of Boston.

TYPES OF MODERN CRUISERS.

COMPARISON OF THREE CLASSES OF HIGH-POWERED VESSELS UNDER CONSTRUCTION FOR THE BRITISH NAVY—ESSENTIAL DIFFERENCES ARE, OF COURSE, A COMPROMISE.

During the present month four battleships and four armored cruisers, aggregating 106,000 tons and 175,000 I.H.P., were launched for the British navy. The four battleships belong to what is known as the Russell class. The four cruisers represent three distinct types, and it is interesting to note the essential differences. The Bacchante, launched by John Brown & Co., Ltd., Clydebank, is the fifth of the Cressy type to be floated. The Good Hope, launched from the Fairfield Co.'s works, is the first of the Drake class; while the Kent, the first of ten vessels of a new class, was launched from Portsmouth. These three types of cruisers in many ways embody modern ideas, notably in respect that they have a large area of their broadside clothed with armor. Much of what is contained in this article regarding them is taken from Engineering of London. The velocity of quick-firing guns has so greatly increased their penetration at long range, and the havoc they may do in the interior of a ship, that dependence could no longer be placed in the protective deck and minute subdivision of the hull. At the same time the metallurgist has, by the face hardening of armor, solved the difficulty formerly experienced of allowing a sufficiency of weight for effective broadside armor protection without materially impairing the speed, which latter must always be more or less paramount in cruiser design. Originally the armor belt required was 10 in. in thickness and of necessity had to be of limited area owing to its weight. Now armor has become considerably toughened as to permit of limited thickness, and consequently extended area. The British admiralty has, therefore, reduced the thickness of armor for the Kent class to 4 in. The vessels are of 9,500 tons displacement. The modern cruiser is, of course, a compromise. It cannot have great defensive qualities, great speed and great gun power. One must give way in degree to the other. Because of this fact, a comparison, within certain limits, of the three typical first-class British cruisers of today is of interest. Thus the Cressy class, first laid down, has the same protection as the Drake class, but being of less displacement something had to be forfeited in the way of speed, although the gun power remained practically the same. In the Kent class, again, the thickness of armor was reduced, as well as the gun power, to give better speed on a reduced displacement and cost. The Drake and her consorts are the largest cruisers yet contemplated, though the United States has in its present naval program cruisers of almost equal size.

CONTRASTS IN DIMENSIONS AND GENERAL FEATURES.

The Cressy class resemble the eight vessels of the Diadem type, with the addition of the side armor; the Drake ships are belted Powerfuls, and the Kent cruisers are modifications of the Cressy. The last named has 6.35 ft. of length to 1 ft. of beam; the Kent rather less, because of her less displacement; and the Drake 7 ft. to 1 ft., as will be seen by the following figures:

Class	Cressy.	Drake.	Kent.
Number ordered	Six	Four	Ten
Length between perpendiculars	440 ft. 0 in.	500 ft.	440 ft.
Breadth	69 ft. 6 in.	71 ft.	66 ft.
Draught	26 ft. 3 in.	26 ft.	24 ft. 6 in.
Displacement	12,000 tons	14,100 tons	9,800 tons
Weight of hull	7,840 tons	8,500 tons	5,895 tons
Speed in knots	21	23	23
Indicated horse-power	21,000	30,000	22,000
Bunker capacity (maximum)	1,600 tons.	2,500 tons	1,600 tons

The ratio of the weight of hull to the total is interesting. In the case of the Cressy it is 65 per cent.; in the Drake, with her great engine power and speed, and in the Kent, with her reduced thickness of armor, but great speed, it is only 60 per cent. This latter approximates the results in the Powerful, which had a deck from 3 in. to 6 in. thick as the only hull protection, while in the Diadem class, also with a 2½-in. to 4-in. deck, it was 63 per cent. Thus structural modifications have been made in all three new classes to make up for any increase in the weight of armor without affecting other elements—armament, magazine accommodation, etc. In the Cressy class the 6-in. belt is 11 ft. 6 in. wide, and the length is 230 ft., terminating 120 ft. from the bow; but here the shell-plating is reinforced with a belt of corresponding width of 2-in. nickel steel extending right to the ram. In the Drake class the belt is about 14 ft. wide, and is 6 in. thick except at the fore part, where 2-in. nickel steel is again used, the total length from the stern being 400 ft., leaving about 100 ft. of the broadside aft with only armored deck and subdivision protection. In the Kent class the same arrangement is adopted, the main belt beginning 106 ft. from the stern. It is 4 in. in thickness, tapering to 2 in. at the bow; its width is as in the Cressy. We have thus 80 per cent. of the length of the Cressy and Drake protected on the broadside, and 76 per cent. of the length of the Kent. In the later ships there is only an armored bulkhead aft where the main belt terminates, and it is 5 in. thick in the Cressy, 12 in. in the Drake, and 4 in. in the Kent. As with all British armored ships now, there are two protective decks—the lower and main, the latter being thicker within the citadel to form its crown. The thickness in the larger cruisers is from 3 in. to 2 in., and generally 2½ in. abaft the main side armor.

And now as regards the armament. The Drake class has greater gun power than any previous cruiser, for not only is there an increase in number, but many of the guns are of the Vickers type, developing greater velocity, and having more penetration than the weapons formerly used. There are in this class two 9.2-in. breech-loading guns, fitted in 6-in. armored barbettes (one forward and one aft). These are served through armored trunks from the magazines and shell rooms by means of hydraulic power, as well as by hand. There are sixteen 6-in. quick-firing guns (four more than in the Powerful), all placed in casemates of 5-in. armor, the rear walls being 2 in. thick. Of the smaller quick-firing guns there are twelve 12-pounders distributed over the upper decks; while forward-and-aft, on the main deck, there are two 12-pounder boat or field guns, three 3-pounders, and nine Maxims. There are also two under-water 18-in. torpedo tubes. The principal difference in the case of the Cressy is that there are only twelve 6-in. guns, and in the Kent class there are four 6-in. quick-firing guns mounted in pairs in 4-in. armored barbettes, instead of the two 9.2-in. breech loaders, one forward and one aft. There are in the Kent ten 6-in. quick-firing guns in 4-in. armored casemates; ten 12-pounder quick-firing guns; three 3-pounder quick-firing guns; eight 45-in. Maxims; with two 18-in. submerged torpedo tubes.

DESCRIPTION OF THE MACHINERY.

We come now to the machinery, and we may give in tabular form the leading particulars, which afford an interesting comparison:

	Cressy.	Drake.	Kent
Cylinders { High pressure ....in.	36	43½	37
Cylinders { Intermediate pressure ....in.	59	71	60
Cylinders { Low pressure ....in.	68 and 68	81½ and 81½	69 and 69
Stroke ....in.	48	48	42
Revolutions	120	120	140
Piston speed ....ft.	960	960	980
Working pressure ....lb.	300 to 250	300 to 250	300 to 250
Number Belleville boilers	30	43	31
Heating surface ....sq. ft.	51,500	71,970	50,300
Grate area ....sq. ft.	1,650	2,310	1,610
Weight of machinery ....tons.	1,800	2,500	1,750
Indicated horse-power per ton....	11.67	12.00	12.56
Square feet of heating surface per indicated horse-power	2.45	2.4	2.29
Indicated horse-power per square foot of grate area	12.7	13.0	13.65

We need not here enter into details as to the designs of the machinery. The high piston speed is one result of the importance of keeping the engines completely under the protective deck, and in action these will, as far as possible, be enclosed within cofferdams. The ratio of cylinders can easily be arrived at from the particulars given. In the case of the Kent, for instance, high pressure to low pressure, it is 6.96, and pressure in the intermediate is to be reduced to 49.5 lbs. The reduction in the weight of machinery to 12.56 I.H.P. per ton in the case of the Kent is interesting; this has been exceeded in the trials of some of the recent ships, and 2.29 sq. ft. of heating surface per unit of power, although less than in recent cruisers, is liberal when comparison is made with the boilers of the cylindrical type worked under forced draft, so that the high result is got without unduly pressing the boilers.

As typical, one or two particulars of the engines of the Good Hope may be given. The high and intermediate pressure cylinders are each fitted with a piston valve, and each low-pressure cylinder with triple ported slide valve with a relieving ring at the back, all the valves being worked by the usual double eccentrics and link motion gear. Reversing is effected by means of double cylinder steam engines, with gear of the all-round type, hand gear also being fitted. The crank, thrust and propeller shafting is of forged steel, and hollow. Each of the propellers has a boss of gun metal fitted with three adjustable blades of bronze. The main condensers will be placed at the back of the engines, and are cast brass of oval form fitted with brass tubes. The condensing water will be supplied by four centrifugal pumps of gun metal, each fitted with an independent engine. The feed, bilge and hot well engines are all independent and separate from the main engines. The auxiliary exhaust steam will be arranged to discharge alternately into the auxiliary condensers, the atmosphere, the low pressure receivers, for working the evaporators. There are two auxiliary condensers, each fitted with a circulating pump and a small air pump. Feed water filters are fitted. The vessels will also be fitted with the usual auxiliary machinery—a complete distilling plant to supply fresh water to the boilers, and for drinking purposes; three sets of engines and dynamos for producing the necessary current for electric lighting; two double-cylinder direct-acting engines, with the necessary gear for steering purposes; two complete sets of air compressing engines and pumps, with the necessary air reservoirs and columns for charging torpedoes; and one ice-making machine of the cold air type, including an ice-forming chamber and a pump for circulating water in the air cooler.

WONDERFUL GROWTH OF OUR EXPORT TRADE.

Exports from the United States continue to increase, and the fiscal year 1901 seems destined not only to break all records, but perhaps touch the billion and a half dollar line. For the twelve months ending with February the total is $1,490,194.985, and for the eight months of the fiscal year it is $1,015,185,374. Thus the record presented by the February statement of the treasury bureau of statistics at least suggests a billion and a half record for the fiscal year 1901, since the twelve months ending with February are less than $10,000,000 below that sum, and the eight months of the fiscal year are $15,000,000 above the proportion which eight months of the twelve included in the fiscal year would be called upon to furnish of a $1,500,000,000 total.

No eight months' period in the history of our export trade shows as large a total of exports as the eight months ending with February, 1901. The total exports during that period are, as above indicated, $1,015,185,374, against $919,473,471 in the corresponding months of last year, and $602,666,873 in eight months of the fiscal year 1896, having thus increased more than 50 per cent. in five years.

The favorable balance of trade, or excess of exports over imports, shows an even greater increase, being $492,224,994 for the eight months ending with February, against $364,219,897 in the same months of the preceding fiscal year, and $61,472,040 in eight months of the fiscal year 1896. No eight months' period in the history of our export trade has shown as large exports or as large an excess of exports over imports as that ending with February, 1901, and no twelve months' period ending with February shows as large exports or as large an excess of exports over imports as does the twelve months' period ending with February, 1901.

On the import side the figures are also satisfactory. The imports of February, 1901, are nearly $5,000,000 less than those of February, 1900, and those for the eight months ending with February are $32,000,000 below those of the corresponding months of the preceding year, while those of the twelve months ending with February, 1901, are also slightly below the twelve months ending with February, 1900. The total imports in the eight months ending with February were $522,960,380, against $555,253,574 in the eight months of the preceding fiscal year, and $541,194,833 in the eight months ending with February, 1896. Thus the imports of the eight months' period show in the five years a decrease of about $20,000,000, while the exports show an increase of over $400,000,000, comparing the eight months ending with February, 1901, with the eight months ending with February, 1896.

NOTES FROM COAST SHIP YARDS.

It is stated that the Gulf Coast Ship Building & Dry Dock Co., capitalized at $3,500,000, will soon be organized in Mobile. If the stock can be sold a ship building plant will be located at Mobile and a dry dock at New Orleans. The incorporators are William Butler Duncan, chairman of the board of directors of the Mobile & Ohio Railroad, of New York; W. D. Munson of New York, president of the Munson Steamship Co.; E. L. Russell, president of the Mobile & Ohio Railroad; Robert C. Morris of New Orleans and M. P. Levy of New York.

Theodore A. Crane's Sons are building at their yard, Erie basin, Brooklyn, a small steam yacht for Mr. Edward M. Brown, formerly commodore of the New York Yacht Club. She will be 60 ft. 7 in. over all, 60 ft. on the water line, 10 ft. 9 in. beam and 2 ft. 4 in. draught. The power will consist of a triple expansion engine with cylinders 4½, 6½ and 11 in. in diameter, with a common stroke of 7½ in.; Roberts' water tube boiler. The yacht is intended for cruising in the shoal waters of Great South bay.

The Pacific Ship Building Co. with a capital stock of $100,000 fully subscribed, was incorporated in San Francisco last week by C. A. Hooper, George W. Hooper, E. F. Burrell, W. G. Tibbetts and W. H. Hooper. Principals of the company have been operating a ship yard for more than a year at Coos Bay and during that time they have built four four-masted schooners—the Manila, Admiral, Forest Home and James Sennett.

The Baltimore Marine Railway Co., Baltimore, Md., successfully launched a fishing steamer from their yard at Atlantic wharf last week. The vessel is building for McNeil & Edwards, Redville, Va. She is 115 ft. long, 20 ft. beam and 9½ ft. depth of hold. She will be equipped with a steeple compound engine, having cylinders measuring 12 and 22 in. The boiler will measure 10 by 9½ ft.

The torpedo boat Tingey will be launched at the yard of the Columbian Iron Works, Baltimore, on March 25. Miss Annie Truxton Craven of New York, a descendant of Com. Tingey, is to christen the vessel. The trial of the torpedo boat Preble, built at the Union Iron Works, San Francisco, will take place on March 23.

The steel sailing ship Acme, building at the ship yard of Arthur Sewall & Co., Bath, Me., is nearly plated up and it is expected that she will be ready to launch the last of April. The keel is stretched for the schooner William P. Frye and workmen have begun framing.

The torpedo boat destroyer Lawrence, built by the Fore River Engine Co., Quincy, Mass., was given a builders' trial trip last week. The test was only preliminary to the official trial trip and no effort was made at speed. A mean rate of 23 knots was maintained.

Bids for the construction of a twin screw steam light-house tender, the Larkspur, have been received by the light-house board as follows: Iowa Iron Works Co., $128,500; Burlee Dry Dock Co., Staten Island, $111,888.

At White Horse Rapids, Alaska, work on five steamers for the White Pass & Yukon Co., which will be run on the upper Yukon river next summer, was begun March 1. Two hundred men are employed.

OLDS MOTOR WORKS FIRE.

The conclusion generally accepted regarding the Olds Motor Works fire at Detroit, referred to in the last issue of the Review, is that the cause was leakage or explosion of natural gas pipes, as the plant was submerged in flames almost instantly. A 3-in. gas main was opened into the center of the buildings. Explosions heard during the fire came from carbonic acid gas tanks, used for inflating the tires. The cause was not gasoline, as that is kept in a tank in a separate building, and the contents of the tank were intact the morning after the fire. The foundry, heating and forge departments were saved.

While the fire results in considerable financial loss it will not in any way impair the continuous order of business. Only slight delays will occur in shipping orders, the company having duplicates of their engine patterns in their factory at Lansing, while the patterns for carriage work were in the vault in the foundry building, which was not burned. A large addition to the Lansing works, doubling the capacity, has already been started and will be completed in thirty days. Material for the stationary engines having been shipped to Lansing, there will be no delay whatever in filling orders up to 35 H.P. A temporary factory was immediately obtained in Detroit, machinery telegraphed for and everything was in full running order within a week. The company will be able to deliver orders in four weeks at most. It is an exceptional illustration of the vim and vigor characteristic of successful business establishments that this large plant could rally so quickly from such a disastrous conflagration and have its large force of operatives busily at work a week after the fire.

A note from the company under date of the 18th inst. says: "All machinery in our temporary quarters has been set and is belted ready for business. All of our automobile patterns and drawings were saved, as well as large quantities of material in our warehouses, which were not burned. This material is intact for the manufacture of "Oldsmobiles," so that the fire will delay our automobile orders not more than about thirty days. We are more determined than ever to make 1,000 "Oldsmobile" gasoline runabouts before the snow flies again. By the last of April we will reach a capacity of ten completed machines per day. Our Lansing plant will take care of our gasoline engine business by running day and night, so that all orders will be filled with the usual promptness. At this writing we have orders for 334 "Oldsmobile" gas line runabouts upon our books. These will be taken care of within the next two months, so that we are now prepared to take orders for May delivery."

The report of the inspection board upon the official trial trip of the Alabama has been received at the navy department. The vessel made an average speed of 15.2 knots per hour. The machinery worked splendidly, although there were a few leaky stuffing boxes, and 7,506 H.P. was developed. Altogether the vessel behaved well and the government will now pay to the contractors the 10 per cent. withheld to cover any faulty work.

CHIEF CONSTRUCTOR BOWLES OPPOSES SHEATHING.

There is going to be no further sheathing of warships, at least not for the present. A black eye was given to the plan by the naval board of construction last week. The plan of sheathing and coppering the bottoms of naval vessels to prevent them from fouling was steadily advocated by Rear Admiral Hichborn, who was recently retired. As a member of the board of construction and as chief constructor he urged the navy department to adopt it, contending that it prevented fouling and thus saved time and expense in docking ships and prevented reduction of their speed. The process consists in covering the steel bottoms of vessels with wood and covering the wood with copper. Tests were made with some of the smaller vessels and were so successful that congress directed that three of the armorclads and six protected cruisers authorized should have their hulls below the water line covered in this way. In the last naval act, however, congress left it to the secretary of the navy to determine whether any naval vessels should be sheathed, and Secretary Long referred the matter to the board on construction for its views. The board recommended that only the six protected cruisers of the Denver class should be sheathed. The report made to Secretary Long was in substance as follows:

"With regard to the three battleships and four monitors under the naval act of 1898, which were not required to be sheathed, the board does not recommend sheathing. With regard to the act of 1899, which required three battleships, three armored cruisers and six protected cruisers of the Denver class to be sheathed, the board recommends that the battleships and armored cruisers be not sheathed, but that the six protected cruisers be sheathed, they being smaller and preparations for sheathing them having progressed so far. With regard to the act of 1900, providing for three battleships, three armored cruisers and three protected cruisers, and which did not require them to be sheathed, the board recommends that they be not sheathed."

Secretary Long approved the recommendations. This was the first important question on which Rear Admiral Bowles, the new chief constructor, has voted since he became a member of the board. He voted against sheathing. The decision of the secretary will necessitate changes in the prices to be paid to the Newport News Co., the Bath Iron Works and Moran Bros. of Seattle for constructing three sheathed and coppered armorclads. There is a clause in the contract providing for a rearrangement of the price to be paid by the government, the sheathed vessels costing more than those not sheathed.

KEARSARGE ORDERED TO NEW YORK NAVY YARD.

The secretary of the navy has sent orders by mail to Rear Admiral Farquhar, commanding the North Atlantic squadron, now at Pensacola, to send the battleship Kearsarge to the New York navy yard for repairs to a 13-in. gun in one of her superposed turrets. It will take two months to make the repairs. This action of the navy department is the sequel to an accident on the Kearsarge during target practice in February. A shell that had been placed in the 13-in. gun exploded prematurely, damaging the bore of the piece. It was denied at the time by the bureau of ordnance that the damage was serious, and the statement was made that the gun could be fired as usual. When Secretary Long visited Pensacola last month he ascertained that there was no means of learning how badly the gun was damaged unless the Kearsarge were sent to New York. It appeared also that the gun would need repairs before it could be used again. The job of lifting out the gun will entail extensive additional work, including dismantlement of the superposed turret in which the gun is installed. First it will be necessary to lift off the upper or 8-in. turret. Then the pair of 8-in. guns will be taken out, and when this is done the lower or 13-in. turret must be removed before the injured gun can be displaced. With the gun it will be necessary to remove part of the turret mechanism. There isn't a crane at the New York yard or any other naval establishment with sufficient lifting power and enough overhang to take the turrets and guns from the Kearsarge, and it will be necessary to go to the expense of hiring the right sort of crane from a wrecking company. The injured gun will be sent to the Washington ordnance factory for examination and repairs, and a substitute piece will be sent to New York from the factory.

RACE FOR A CHARTER—LOST.

It was a race for a charter—a valuable five-year charter in the China trade—and the new British tramp steamship Heathburn lost it by a nose. She is a steel single screw, only little more than a month from the yard of her builders, Craig, Taylor & Co. of Stockton-on-Tees. Before she was launched her owners had secured the five-year charter for her and had promised to deliver her to the order of her charterers inside Sandy Hook at 12 o'clock, noon, on Friday last. She passed in at the Hook at 1 o'clock last Saturday morning, thus forfeiting her charter. And what a trip she had through wintry seas, literally "racheting her rivets loose!" Never has any freighter been constructed so rapidly as the Heathburn. She was towed to Sunderland on Feb. 10 and next day her engines, the stout triple expansion sort, were slapped into her. It required only five days to get the engines ready for business. If it had been four the freighter might have won her charter. She was manned by a picked crew and only selected coal was hurled into her furnaces. Capt. Ketley had been instructed to run at top speed throughout the voyage. Every soul aboard knew it was a race for a charter, and from chief engineer to stoker every man did his level best to get the tramp to port on schedule. But the Atlantic was in boisterous mood. The Heathburn found a dozen more healthy and vigorous tempests in her course and some days, although her engines throbbed lustily, she was able to make no more than 100 knots. It took her just twenty-two days to get from Middlesboro. She was in ballast and her high freeboard helped to retard her. She went into dry dock in Erie basin, Brooklyn, Saturday afternoon for a general overhauling, which she needs.

The French admiralty announces that the construction of a protected cruiser of 12,500 tons displacement with a speed of 22 knots an hour will be begun at Toulon at once. Three submarine boats of the most improved style are also to be built there immediately. Twenty additional submarine boats, eleven torpedo boats, ten torpedo boat destroyers and an ironclad will follow in short order.

MASTERS AND ENGINEERS OF LAKE VESSELS.

Parker, A. A. & B. W., Detroit: Steamers—A. A. Parker, Capt. J. T. Hutton, Engineer M. J. Gilligan; John Oades, Capt. T. Lemay, Engineer H. L. Merrill; John Pridgeon, Jr., Capt. D. N. Sherwood, Engineer John Mogan; B. W. Blanchard, Capt. Thos. Meikleham, Engineer John Bloome; Favorite (wrecker), Capt. Martin Swain, Engineer Geo. L. Simmons; Saginaw (wrecker), Capt. I. Watt, Engineer ———. Schooners—B. W. Parker, Capt. Edward Lohr; Saveland, Capt. Henry Morey.

Detroit & Cleveland Nav. Co., D. Carter, Mgr., Detroit: Steamers—City of Detroit, Capt. A. J. McKay, Engineer W. S. Huff; City of Cleveland, Capt. Archibald McLachlan, Engineer John T. Hall; City of Alpena, Capt. Mathew Lightbody, Engineer A. Phillips; City of Mackinac, Capt. H. J. Slyfield, Engineer Wm. McDonald; City of the Straits, Capt. Duncan McLachlan, Engineer D. Donaldson; State of New York, Capt. Salem Robinson, Engineer Wm. Stein.

Pere Marquette R. R. Co., W. L. Merceneau, Mgr., Ludington, Mich.: Steamers—F. & P. M. No. 2, Capt. Wm. Barnett, Engineer Geo. DePuy; F. & P. M. No. 3, Capt. J. A. Dority, Engineer Geo. Williams; F. & P. M. No. 4, Capt. Jos. Russell, Engineer Robert McLaren; F. & P. M. No. 5, Capt. John J. Doyle, Engineer Hy Nyland; Muskegon, Capt. G. L. Thompson, Engineer F. Sylvester; Pere Marquette, Capt. Peter Kilty, Engineer Robert Thielman.

Champlain Transit Co., Burlington, Vt.: (Steamers on Lake Champlain and Lake George.) Steamers—Vermont, Capt. R. Arbuckle, Engineer Peter Forrant; Chateaugay, Capt. E. J. Baldwin, Engineer Edward Peria; Maquam, Capt. E. J. Hawley, Engineer Wm. Young; Horicon, Capt. E. S. Harris, Engineer Julius Perrault; Ticonderoga, Capt. F. G. White, Engineer ———; Mohican, Capt. Wesley Finkle, Engineer H. Peria.

Prindiville & Sons, John, Mgrs., Chicago: Steamers—Jesse Spalding, Capt. James Travis, Engineer Fred Otto; Geo. G. Hadley, Capt. M. Fitzgerald, Engineer John Hogan; Panther, Capt. J. H. Madden, Engineer E. Scott; Niko, Capt. Thos. Beggs, Engineer Luke Manion. Schooners—A. M. Peterson, Capt. Chas. Bough; J. G. Blaine, Capt. Patrick Meagher; Massasoit, Capt. Duncan Buchanon.

Calbick & Co., J. A., Chicago: Steamers—Kalkaska, Capt. H. S. Shackett, Engineer C. F. Jubenville; J. H. Prentice, Capt. R. T. Evans, Engineer F. R. Winkle; Oregon, Capt. ———, Engineer Geo. Quackenbush. Schooners—R. L. Fryer, Capt. Emil Christen; Oak Leaf, Capt. A. T. Hanson; Middlesex, Capt. Paul Weimar; Halsted, Capt. John Lundberg, S. H. Foster, Capt. ———.

Lehigh Valley Trans. Co., L. H. Van Allen, Supt., Buffalo, N. Y.: Steamers—Wilkes-Barre, Capt. D. Driscoll, Engineer ———; Tuscarora, Capt. Wm. Williams, Engineer ———; Saranac, Capt. C. A. Potter, Engineer ———; Seneca, Capt. J. A. Whiteside, Engineer ———; E. P. Wilbur, Capt. C. E. Fuller, Engineer ———; Mauch-Chunk, Capt. P. McFarlane, Engineer ———.

Sands, Louis, Manistee, Mich.: Steamer—Maggie Marshall, Capt. August Johnson, Engineer Wm. Martin. Schooners—Isabella Sands, Capt. J. L. Jensen; A. W. Luckey, Capt. Andrew Olsen; Arendal, Capt. Anton Erickson. Tugs—Third Michigan, Capt. Henry Danforth, Engineer ———; Hunter Savidge, Capt. ———, Engineer ———.

Lake Michigan Car Ferry Trans. Co. (controlled by Wisconsin & Michigan Ry. Co.), Chicago: Steamer—S. M. Fischer, Capt. F. Johnson, Engineer S. West. Schooners—Thompson No. 1, Capt. M. Emerson; Thompson No. 2, Capt. Wm. Chambers.

Nester, Geo., Detroit, Mich.: Steamer—Schoolcraft, Capt. Joseph Bourassa, Engineer John Murnane. Schooners—Geo. Nester, Capt. F. W. Trent; Mary N. Bourke, Capt. E. J. Peabody; Keweenaw, Capt. Henry Balfour.

Pringle, John, St. Clair, Mich.: Steamer—D. Leuty, Capt. John C. Pringle, Engineer Jas. A. Southgate. Schooners—R. Bottsford, Capt. A. Sharram; F. B. Gardner, Capt. R. T. Pringle.

Holland, Nelson C., Buffalo: Steamer—Chas. Hebard, Capt. Geo. D. Ryan, Engineer Wm. Schumaker. Schooners—Aloha, Capt. McCarter; Annabell Wilson, Capt. Peter Johnson.

Rardon, J. J., Chicago: Steamers—W. P. Ketchum, Capt. Chas. J. Higgins, Engineer Wm. Nicholas; Phenix, Capt. E. C. Vanpatten, Engineer Michael Maher.

North West Transit Co., Sarnia, Ont.: Steamers—United Empire, Capt. John McNab, Engineer ———; Monarch, Capt. E. Robertson, Engineer ———.

S. W. Transit Co., Charles T. Williams, Mgr., Cleveland: Steamer—A. G. Lindsay, Capt. C. H. Woodford, Engineer C. Burns.

Shoal Water Trans. Co., Mt. Clemens, Mich.: Steamer—Norwalk, Capt. Frank Goodrow, Engineer Joe Bedore.

Fleming & Co., P. H., Chicago: Steamer—Baltimore, Capt. M. H. Place, Engineer Peter Marcoux.

McCormick, H. W., Bay City, Mich.: Schooner—Oneonta, Capt. Barney Shean.

A joint circular, signed by A. J. Smith, general passenger and ticket agent of the Lake Shore Ry. Co., and W. F. Herman, general passenger agent of the Cleveland & Buffalo Transit Co., has been issued, announcing that between May 1 and Nov. 30, 1901, tickets of all classes issued by foreign lines, and which are good for transportation over the Lake Shore road between Cleveland and Buffalo, in either direction, will be accepted for passage on the Cleveland & Buffalo Transit Co.'s steamers. Tickets reading eastbound over the Lake Shore from Cleveland to Buffalo should be presented to the purser of the C. & B. Co.'s steamers at Cleveland and those reading west bound from Buffalo to Cleveland to the steamboat purser at Buffalo. The rule will also apply to Lake Shore patrons bound to points west of Cleveland, and to passengers coming into Cleveland from the west on through tickets, but who prefer the boat ride to Buffalo. In the latter case the exchange will be made by conductors of trains from the west coming into Cleveland.

TRADE NOTES.

Business of the Boston Woven Hose & Rubber Co. of Cambridgeport, Mass., in the Chicago district seems to be increasing on a decidedly large scale. Mr. Huxley, manager of the Chicago offices, announces that they have been obliged to lease a new ground floor store and basement at 185-187 Lake street, about a block east of their present location. With increased space and facilities a much larger stock of mechanical rubber goods will be carried. It is the intention to run the Chicago stock down to as low a point as possible before moving to the new quarters, and to this end advantageous prices are being made on a list of goods of which there is an over stock.

The Falls Hollow Staybolt Co. of Cuyahoga Falls, O., is now represented by J. Blair Farrar, No. 39 Merchants National Bank building, Richmond, Va., and by W. E. Cornwell, No. 80 Pine street, New York. In a letter referring to the establishment of these agencies the Falls company says: "We are now rolling at our Cuyahoga Falls works hollow bolts by our recently improved process, which enables us to produce hollow bars of iron or steel on an average of 8 ft. length and any size outside or inside diameter, perfect in every particular. The bars are all ready to cut, thread and apply, which saves the expense of drilling tell-tale holes, a practice that is not only expensive but injurious to a staybolt."

An admirable display of pipe threading and cutting machines—hand machines, power machines and combined hand and power machines—is made in a well-printed catalogue that is issued by the Merrell Mnfg. Co. of Toledo, one of the leading concerns of the United States in this line. Designs of this company's machines certainly combine all that is latest and best and are fully guaranteed as to construction. The machines are characterized by their efficiency in cutting many sizes of pipe with one set of chasers, and by the convenient means of readily changing the chasers to different sizes. In adjusting, the chasers can be quickly opened and positively closed. There is the combined arrangement of cutting and threading pipes, the adaptability of the machines to cut and thread many sizes of pipes with one set of chasers, and quick means of changing the chasers for different sizes.

The Boston & Lockport Block Co. recently held its annual stockholders' meeting at the office of the company, Lockport, N. Y., when the following directors were chosen for the ensuing year: Albert D. Bosson, Frank Gebbie, Myron H. Tarbox and Mrs. Adelaide C. Beverly. A meeting of the directors was soon after held in East Boston at the office of the company, when the following officers were elected to succeed themselves: President, Albert D. Bosson of Boston; vice president, Frank Gebbie of St. Johnsville, N. Y.; secretary and treasurer, Myron H. Tarbox of Boston; assistant secretary, Alfred B. Tarbox of Boston. The treasurer's report showed a very satisfactory season's business for 1900, and a very fair outlook for the future, one marked feature of the present season's business being the great increase, not only in tonnage, but in the size of the vessels being built. Blocks that at one time would have been considered ample for all kinds of uses now seem insignificant compared with what is now required. The introduction of wire rope rigging and also the fact that many sails are hoisted by steam, requires blocks of the strongest and best quality that can possibly be made.

R. D. Wood & Co. of Philadelphia have issued a catalogue under the title "Hydraulic Tools, Cranes and Machinery," which is of a most extensive character. In the introduction the book says: "For the majority of operations to which hydraulic power can be applied, and especially those requiring very great force exerted through a comparatively short stroke, as in riveting, punching, shearing, lifting, forging and flanging, there is no other system at all comparable with it for efficiency, uniformity, simplicity or economy. This is true for several reasons; primarily in that there is absolutely no motion or power consumed except in the act and at the moment of performing the desired operation. At all other times everything is at rest. Secondly, the question of transmission from generator to machine is reduced to a small pipe carrying water, which, under proper conditions, is done with an efficiency far surpassing that of the line shaft, electric wire or air tube. This mode of applying power has all the flexibility of the two latter methods with a capacity far beyond them for delivering quickly. This is one of the most important features of the hydraulic system, and its full realization is obtained by the use of accumulators of ample capacity. Under such conditions it is the usual experience to have all the energy which a steam pump can deliver in the course of ten or fifteen minutes utilized in the hydraulic machine within a few seconds. This is not possible in the use of any other form of machine tool. In the item of wear alone no other is so easy of maintenance, and requires so little attention as the hydraulic form." The book is printed upon excellent paper and is superbly illustrated throughout.

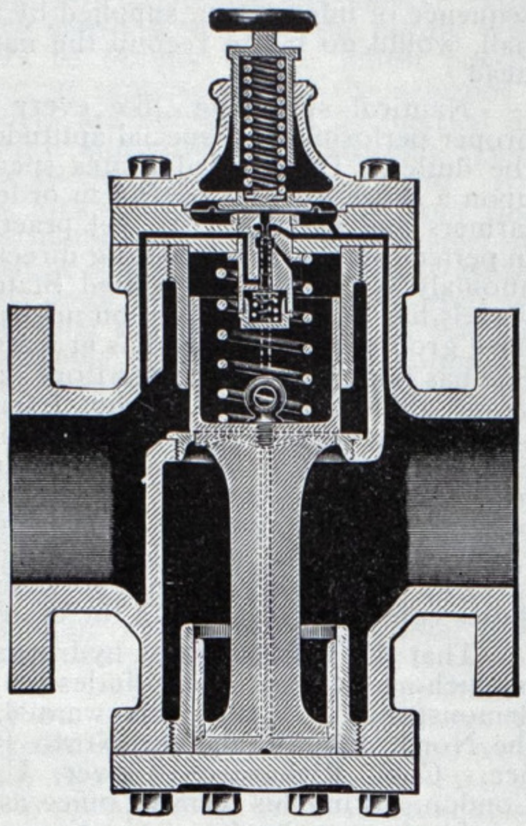
Monthly blast furnace statistics again show an increase in the production of pig iron. Coke and anthracite furnaces in blast on March 1 had a weekly capacity of 284,825 gross tons, as compared with 269,923 tons on Feb. 1. "We are thus approaching," says the Iron Age, "the high rate of production of the boom period. We are now running at the rate of, say 14,750,000 tons of iron yearly, exclusive of charcoal metal, and will add to it during the next few months, since a number of very large furnaces are approaching completion. In spite of this enormous production stocks are actually declining. During February they fell off from 483,528 tons to 455,840 tons. This does not include the steel stocks, which six months ago were very large, and are now practically wiped out. The consumption which these figures prove is enormous. It seems almost impossible to understand where this enormous tonnage goes, and yet there is today an actual scarcity of certain grades of pig iron, notably those for steel making purposes."

The steamer City of Trenton, built for the Wilmington Steamboat Co. by Neafie & Levy of Philadelphia, was launched on Tuesday last. As soon as the vessel left the ways the keel of a sister vessel, to be built for the same company, was laid. The City of Trenton is 162 ft. long, 32 ft. beam and 8 ft. depth of hold. She will be equipped with triple expansion engines of 10, 15 and 25 in. cylinder diameters and 18 in. stroke.

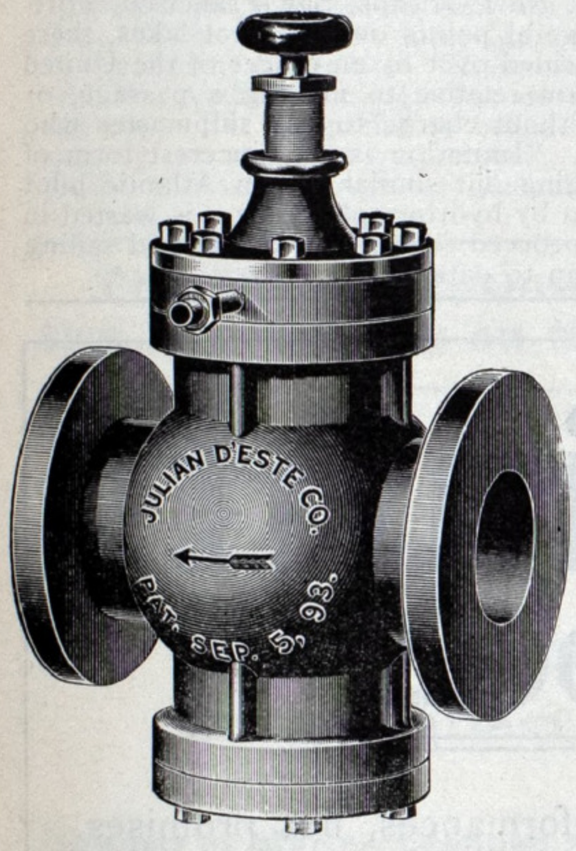
To Chicago via B. & O.—Daily trains, through sleeping cars, 6:35 and 9:35 p. m. $8.50 first, $7.00 second class. Mar. 28.

IMPROVED STEAM PRESSURE REGULATOR.

Julian D'Este & Co., No. 24 Canal street, Boston, manufacturers of Curtis engineering specialties, are directing attention to an improved steam pressure regulator that is especially adapted in steamboat service to steam heating pipes, steering engines, electric light engines, hoisting engines, "and in short," as they say, "for universal application to all the varied and various conditions under which a reduced pressure of steam, water or other fluids is required. It is compact and self-contained, without levers, weights or projections. It has no drip or leak of steam or water. All that passes into it passes through it, without waste or loss. It has no glands or packing; and the seat may be made of any suitable material for steam, water or any other gas or fluid."



The operation of the device is as follows: The sectional view shows a main valve operated by a loose-fitting piston; a secondary valve in the top of the chamber over the piston; a metallic diaphragm (performing the double office of operating the secondary valve and making a joint to the cap which contains it), and a side passage connecting the chamber under the diaphragm with the outlet. When the spring over the diaphragm is compressed the diaphragm gives way, and thus opens the secondary valve upon which it rests, allowing the steam to escape from the upper side of the main piston valve into the low service, and at the same time opening a port to the under side of the piston, admitting full boiler pressure, which lifts the main piston valve open to its full capacity. The main valve remains open until the back pressure, communicated from the outlet through the side passage, is sufficient to raise the diaphragm and thus close the secondary valve, shutting off high pressure from the bottom of the piston; then the high pressure steam or water fills by the loose-fitting piston, in the space on top of the piston, and forces it on its seat, thus uniformly maintaining the pressure at which it is set.



Referring to the features of this device that are regarded as especially advantageous, the manufacturers say: "This regulator contains a novel combination of old and established principles; is made entirely of metal; occupies the same space as a globe valve for the same size pipe; is a lock valve, and is very simple and sensitive. Our experience with thousands of various sizes is that not one-half of one per cent. of the diaphragms or springs have failed in eight years, and as each size is made to a standard gauge any injured piece can be replaced at a moment's notice. It is a regulator suitable for any boiler pressure, and will deliver accurately and uniformly any lower pressure from one to within a few pounds of the initial pressure. It is used on steam-heating apparatus, slashers, jacket kettles, air and water pumps; on steamships for deck machinery, pumps, supplying steam to engines at lower than boiler pressure, or at any place where it is desired to reduce from a high pressure to a lower pressure. In pulp and paper mills, on digesters and on the dryers, it is highly recommended and can be used in connection with exhaust steam, and we can guarantee perfect work and scientific drying of all grades of papers."

ON THE SUBJECT OF ELECTRICAL EQUIPMENT.

Rules for the electrical equipment of merchant vessels, contained in a catalogue just issued by the Seidler-Miner Electric Co. of Detroit, make the book valuable, aside from the fact that it will go a long way towards standardizing electrical appliances of a marine kind. The Seidler-Miner company has been successful and progressive, and their efforts of nine or ten years past to so organize their business that they will be specially equipped to meet the requirements of ships is shown in this catalogue. "Our aim," they say, "has been in the direction of a standard in this line of equipment, which is certainly desirable, as it has been found very difficult in the past to procure fittings for repairs. A great number of different makes were originally furnished by various manufacturers, who in most cases used their own special devices and could not afterward furnish duplicates if called upon to do so."

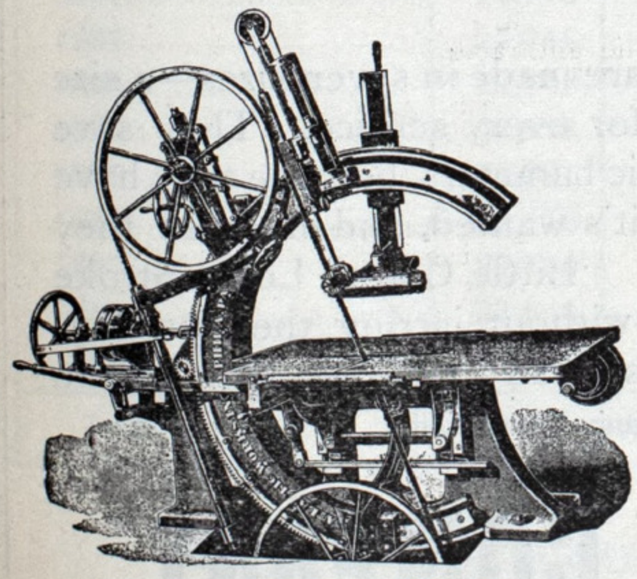
The work of the Seidler-Miner Co. is to be found on steam vessels of the great lakes, oceans, coasts and western rivers. Members of the firm, which was established in 1891, are B. F. Seidler and F. J. Miner. Mr. Seidler had many years' experience as a practical electrician and engineer before starting the Detroit business, and Mr. Miner, who had followed the lakes and was a charter member of the Detroit lodge Shipmasters' Association, had given particular attention to the peculiarities of electrical work on shipboard.

It is the intention to furnish a copy of this catalogue to all marine engineers on vessels that have electric plants. Engineers are invited to send their addresses, as well as names of vessels on which they are now or will be employed, to the Detroit firm.

During the present week the lists were opened for subscriptions to an issue of $3,000,000 worth of 7 per cent. preferred stock of the Dominion Iron & Steel Co., Ltd., at $85 per share and accrued dividends. The amount was three times oversubscribed. The capital consists of $15,000,000 in common stock issued and fully paid, and $5,000,000 in 7 per cent. cumulative preference stock. According to the company's circular, one furnace at Sydney has already been producing iron for some weeks; another is to be ready this month, two more by June, and the steel plant by October, 1901. Mr. Moxham, the general manager of the company, estimates that 300,000 tons of pig iron and 60,000 tons of blooms will be produced in 1901. The Canadian government having granted bounties beginning with $2 and $3 per ton on pig made from foreign and native ore respectively, and $3 per ton on steel, graduating down to 40 and 60 cents each for these products in the seventh year, the company expects to earn $8,000,000 from this source by the end of 1907.

The Nickel Plate road will sell excursion tickets to students holding certificates from school principal, at one and one-third fare for the round trip, account the Easter vacation. Tickets available day before school closes, the closing day and day immediately after, the return limit to cover period of vacation. Write, wire, 'phone, or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 32April 4.

SEIDLER-MINER ELECTRIC CO.
DETROIT, MICH.
Electric Lighting of Ships
OUR SPECIALTY.
COMPLETE INSTALLATIONS OR RECONSTRUCTION,
SAFE, SUBSTANTIAL AND EFFICIENT.
DEALERS IN
Marine Electrical Supplies AND Special Fittings.
Catalogue and Marine Rules on application.


ADJUSTABLE BEVEL BAND SAW.
Will bevel both ways to 45 degrees.
Power movement to change angles.
Power feed in three directions.

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ATLANTIC WORKS INCORPORATED,
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MANUFACTURERS OF
MACHINERY FOR WORKING WOOD FOR USE IN SHIP YARDS, CAR SHOPS, RAILROAD SHOPS.
SEND FOR CATALOGUE. ESTIMATES FURNISHED.
Hollow Chisel Mortisers. Car Sill Dressers.

NAUTICAL SURVEYING.

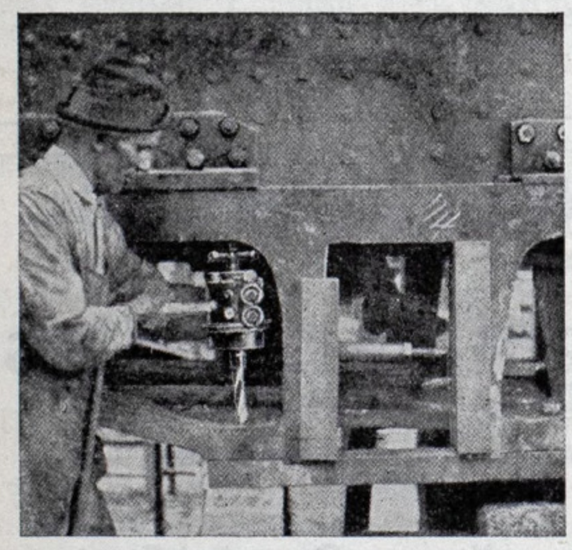
From Syren and Shipping, London.

Charts and sailing directions are not less necessary to ships than lights and anchors, if safety of life and property be deemed of the highest import. The old-time mariners managed to get round the world without mishap, although almost destitute of such desirable aids. It is well to bear in mind that a few days did not count for much in a passage before the marine engineer and his black squad became such important items in a crew list; thus leaving a ship master plenty of opportunity to shorten sail at night, navigate along a parallel of latitude, knowing full well the land was somewhere to east or west of him, and keep a good lookout while going slow. Steam has introduced a boldness in cutting off corners which occasionally proves fatal, for the very best of charts are not always absolutely correct when issued, while at the same time, in certain parts of the world, where coral insects abound more especially, the bottom of old ocean is ever becoming less distant from the surface. Moreover, there are quite large areas of water which are either not surveyed at all, or very imperfectly indicated on navigating charts. Charts and sailing directions should form part of a ship's outfit; not, as is too often the case, the private property of the shipmaster, who, in order to save himself expense which he can ill afford, endangers the safety of all hands by preventing the navigating officers from having free access to these absolutely necessary aids to a successful voyage in all sorts and conditions of weather. Quite recently, the Suffolk, with a costly cargo of horses from the Cape to Algoa bay and 129 of a crew all told, came to grief while proceeding without a large scale chart of the coast or a copy of the admiralty pilot chart relating thereto. Findlay's directory, cautioning as to current, was on board; but, so far as the officer of the deck's acquaintance therewith was concerned, it might just as well have been at the bottom of the deep blue sea. A similar steamer, the Ailsawald, went ashore near Perim, and the court of inquiry felt constrained to express profound surprise at finding a modern vessel sent to sea, and her master called upon to navigate an unbuoyed and unlighted waterway such as the Red sea, without possessing the latest charts and books of references relating thereto.

England is easily first in the highly important matter of nautical surveying, and the war navies of other nations ungrudgingly award the palm to the British hydrographic department. It is often well to see ourselves as others see us, and the recently issued annual report of Com. C. C. Todd, U. S. N., the hydrographer at Washington, affords an excellent opportunity. The United States now possesses a war navy of first-class ships—the old wooden curiosities having been relegated to museums or to training purposes—and is straining every nerve to resuscitate its moribund mercantile marine. Yet, curiously enough, our near kindred do not take a hand in the interesting game of nautical surveying. Com. Todd points out that three-fourths of the sailing directions used by United States warships have to be purchased abroad, although circumstances might arise that would prevent purchase from foreign sources of these aids to safe navigation, thus ensuring disaster at a critical moment. England has a goodly fleet of surveying ships, under the control of her hydrographic department, engaged in perfecting charts and sailing directions wherever possible. There is plenty of this class of work to do, and the need therefor increases every day, so that this country cannot do better than add a few such ships to the royal navy, fully remembering that peace has its victories no less than war. A big sailing ship, or a palatial passenger liner, for example, saved from the merchant-marring rocks in consequence of information supplied by the hydrographic department, Whitehall, would go far to recoup the nation for monies expended under this head.

Nautical surveying, like every other walk of life, requires for its proper performance a special aptitude and training in those who carry out the duties. The United States spends thousands of dollars per annum upon a shore weather bureau in order to protect the lives and property of farmers and agriculturists, yet practically does not lay out a single cent in perfecting charts and sailing directions away from its own coasts. This anomaly is costing the United States dear. More than one of her war vessels has been totally lost on uncharted dangers of late, and many others have grounded. England has at least been true to herself under this head. She has not extended her territory in far off climes and left her seamen to grope about for years without reliable aids in the shape of charts and sailing directions. Cuba and the Philippines simply bristle with uncharted dangers; and it behooves the United States, for its credit's sake, to have these waters, as well as the Hawaiian islands, thoroughly surveyed by ships sent out specially for that praiseworthy purpose. Battleships and cruisers under the starry flag certainly do attempt to mend matters by carrying out surveys when possible, but they are better employed on duties connected solely with the destroying, not the saving, of ships.

That the United States hydrographic office is eager for, and capable of, such nautical surveying duties on the lines adopted over here, needs no demonstration. If any were wanted, it is afforded by the pilot charts of the North Atlantic and the North Pacific issued each month by that office. Com. Richardson Clover, U. S. N., now the naval attache in London, during his term of office as hydrographer, brought these much-sought-after guides for navigation up to a high state of perfection from which they have not been allowed to fall short one iota. Ships under every flag co-operate with the Washington hydrographic office by furnishing observations taken at sea every voyage; and, of the 1,703 merchant ships thus gladly assisting, not fewer than 1,101 were British! Nearly 38,000 of these pilot charts were given away to shipmasters during the twelve months embraced by the report. At Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, San Francisco, Portland and Port Townsend, and at several points on the great lakes, there are branch hydrographic offices, presided over by an officer of the United States navy, where every information relative to making a passage, or dangers in the track, is supplied without charge to any shipmaster who troubles to call during office hours. "Imitation is the sincerest form of flattery," and England is just bringing out similar North Atlantic pilot charts. Nevertheless, that care taken by hydrographic offices is wasted in a great measure if shipmasters will proceed to sea with charts and sailing directions which are not corrected up to date.



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have won and are every day winning through performances, not promises. Their strong hold on the favor of good mechanics lies in the fact that they never disappoint. Our "Little Giant" Piston Air Drill has repeatedly demonstrated its superiority in competitive tests. It is the only Piston Air Drill having a double-balanced Piston Valve cutting off at 5/8 or full stroke, and it does its full duty on 50 per cent. less air than is required by rotary or other makes of air drills. It has no vibration, can be run in a bath of oil and will work very close to a corner.

"Little Giant" Pneumatic Hammers are made in seven sizes—a size for every service. They save fully 30 per cent. in air over ordinary pneumatic hammers, because they have a regulator which lets in the air exactly as it's wanted, and because they cushion on the exhaust instead of on live air. "Little Giant" Long Stroke Hammers drive rivets perfectly up to 1 inch without jarring the operator. This hammer has only three moving parts—less than any other long stroke hammer in the business. **Ask for Catalog "E" and study it for profit.**

STANDARD PNEUMATIC TOOL COMPANY,

MANUFACTURERS OF ALL KINDS OF PNEUMATIC TOOLS AND APPLIANCES.

Main Offices, Marquette Building, CHICAGO, ILL. NEW YORK OFFICE, 141 BROADWAY.

ENGLISH VIEW OF AMERICAN STEEL COMBINE.

From Iron and Coal Trades Review, London.

A consolidation of producers will be more likely to produce cheaply than an individual. That the steel manufacturers of the United States will be able to produce more cheaply by their united action is more than probable. L'union fait la force. But how about the consumers? How, also, about the outside markets of the world, which it is the hardly veiled aim of the American manufacturers to occupy to the fullest possible extent? There is not a little reason to suppose that if the schemes of American manufacturers and financiers are not defeated by internal dissensions European countries will find it more difficult to struggle against American competition with the new forces arrayed against them. It is not at all improbable that the new arrangements, resulting from these combinations, will enable American manufacturers to produce steel 10s. per ton cheaper than would otherwise be possible. One authority assigns a saving of 5s. to 6s. per ton to the single fact that changing rolls will now hardly be necessary. There are other obvious and more or less considerable economies which must profoundly modify the old conditions. It therefore becomes worth while to consider how our own country is likely to stand in relation to this new movement.

The total quantity of pig iron produced in the United Kingdom in 1899 was over 9,300,000 tons, and the total quantity exported as pig iron and as finished iron and steel, allowing 10 per cent. for waste and loss in commission, would probably be about 4,100,000 tons, leaving 5,200,000 tons, as pig, to be consumed in the United Kingdom. To this is to be added the imports of iron and steel into the United Kingdom, which for 1899 were about 500,000 tons more, again as pig, making a total home consumption of 5,700,000 tons in terms of that commodity. It is obvious that if the government of the day were to consent to the imposition of import duties on the same scale as those levied in the United States, the manufacturers of the latter country could not materially affect, and would not in any way be able to control, this major quantity—at least not directly. It could only be affected by competition in those branches of manufacture into which our home consumption of iron and steel enters, such as ships, armor, boilers, engines and machinery of all kinds.

If, therefore, the American plan of campaign were likely to drive us into a tight place, we should unquestionably be justified in looking to the government to do something to protect our great industry from threatened ruin. But many things are likely to happen before then. We may even adopt the American system at home, and "better the instruction." If consolidation is to be the final solvent and determinant of cheap production, and the rentention of foreign markets, the system need not be limited to American experience. There were strong men before Agamemnon, and Mr. Andrew Carnegie has no monopoly of astuteness and business capacity. But we prefer to believe that the latest American scheme is entirely too vast, too cumbersome, too unnatural, and too subversive of public and vested interests generally, to hold together for any length of time.

The Marine Review wants a representative in every city on the Great Lakes.

"HOW TO RUN A GAS ENGINE."

The above is the title of a treatise in preparation by Mr. John W. Coates, No. 29 Broadway, New York. Mr. Coates from his long practical and theoretical knowledge and experience in building, designing and in general repairing of gas engines, will no doubt have matter of much interest to owners, users and prospective buyers of gas engines, as this treatise will contain a brief history and general description of, care and management of, and questions and answers concerning gas engines. Mr. Coates has now under construction a new self-starting and reversing marine gas engine which eliminates many of the faults common in present types. This engine can be built of any horse power desired. He is also doing an extensive business in general repairing of gas engines.

A contract for the construction of a steam vessel for the United States engineer at San Francisco has been awarded to Henry P. Christie of San Francisco.

Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

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THE LATEST AND BEST STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON ORDER, OR STOCK ORDERS PROMPTLY FILLED.

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OPEN-HEARTH STEEL CASTINGS OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO 80,000 POUNDS WEIGHT.
MACHINE WORK AND PATTERNS FURNISHED WHEN REQUIRED.
RAIL OR WATER DELIVERIES.
CAPACITY, 1500 TONS PER MONTH

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"BENEDICT-NICKEL" SEAMLESS TUBING
FOR CONDENSER TUBES

Contains NO ZINC nor any weakening metal.
Send for Booklet with treatise on "Electrolysis of Condenser Tubes."

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V. WARING N.Y.

BELLEVILLE GENERATORS

Grand Prix 1889 Hors Concours 1900
Originated 1849 Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890	22,576	820									
1891	22,749	22,777	68								
1892	22,749	22,801	23,274	7,753							
1893	22,793	22,781	22,762	22,749							
1894	22,813	22,789	22,858	22,813	12,567						
1895	22,891	22,922	22,913	22,936	13,629	9,571					
1896	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE ST. DENIS (SEINE), FRANCE.
TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

MARCONI IN THE UNITED STATES.

Signor Marconi, the wireless telegrapher, is at present in New York. He expects to visit the New England coast and Nova Scotia to find sites for receiving stations for his aerial system. He says he has equipped twenty-eight British, four Belgian and three German warships with signalling and receiving plants. He declares that a vessel fitted with his apparatus can signal 200 miles. The North German Lloyd steamship Kaiser Wilhelm der Grosse is equipped with the Marconi system and there will be a special room aboard the line's new swift steamship Kronprinz Wilhelm, which will be in commission next September, for signalling through space. Mr. Gustav H. Schwab of the North German Lloyd suggests that the government might put a receiving station on the Nantucket shoal light-ship and another communicating with it on the nearest point of land connecting by cable with the mainland. By this means New York might hear of the appearance of liners ten hours before Fire island sighted them.

In regard to Tesla's declaration that he soon will be able to communicate with Europe without wires, Marconi said: "I do not see why that may not be accomplished in time. The possibilities of the field are almost infinite."

A STANDARD METAL POLISH.

The great amount of brass and bright work on modern vessels has created a demand for an effective burnishing compound, which will rapidly brighten and renew all metal surfaces. Such a polish has been discovered in "Burnishine," which is now quite generally used. This polish, which is manufactured by J. C. Paul & Co., 57 Dearborn street, Chicago, has, since its introduction, rapidly gained in favor. It contains no acids or anything which would injure the metal or the hands. It is not greasy or gummy, and does not leave deposits in corners or on the surface of the metal. A few rubs are all that are required and the article is handsomely burnished. The result is a wonderfully brilliant luster on brass, copper, tin, zinc, silver, nickel or other metal. Those who are in search of an article that will keep the brasses and engine pistons, etc., in the brightest shape, and with a minimum amount of labor, are recommended to try Burnishine, in either liquid or paste form. It is put up in 2-ounce cans, 4-ounce bottles and ½ pint, 1 pint, 1 quart, 2 quart and 1 gallon cans. The eastern trade is supplied by Paul N. Friedlaender, 100 Maiden Lane, New York.

During the past week the Graham & Morton Transportation Co. has absorbed the Holland-Chicago line of steamers, including the Ottawa, which is now undergoing construction at the Craig Ship Building Co.'s Works, Toledo. This vessel was intended by the Holland-Chicago line to run between Holland and Chicago, but it is announced that the steamer will now be placed on the St. Joseph-Chicago run. Two of the smaller vessels of the Holland line will be retained on the Holland-Chicago run, one of them being the Soo City. It is understood that since the burning of the City of Louisville the Graham & Morton Co. has been severely handicapped for vessels and had made several overtures to make a sale. The failure of the river and harbor bill to pass, carrying an appropriation for the deepening of the harbor at Holland, operated as an inducement to the Holland line to sell, as the Ottawa could not enter the harbor at its present depth.

Sealed proposals will be received at the office of the Light-House Board, Washington, D. C., until 2 o'clock, P. M., April 24, 1901, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the stern-wheel steel steam tender Oleander, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to the Light-House Board, or at the office of the Light-House Inspector, Memphis, Tenn. F. J. Higginson, Rear Admiral, U. S. N. Mar. 28.

BURNISHINE.

THE MOST MARVELOUS METAL POLISH IN THE WORLD.

In Liquid and Paste Form.

Will Polish Hot or Cold Metal, no matter which.

Produces a wonderfully brilliant lustre on brass, copper, nickel and all metals, no labor required.

Used on steamers all over the world. Free samples on application.

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57 Dearborn St., CHICAGO, ILL.

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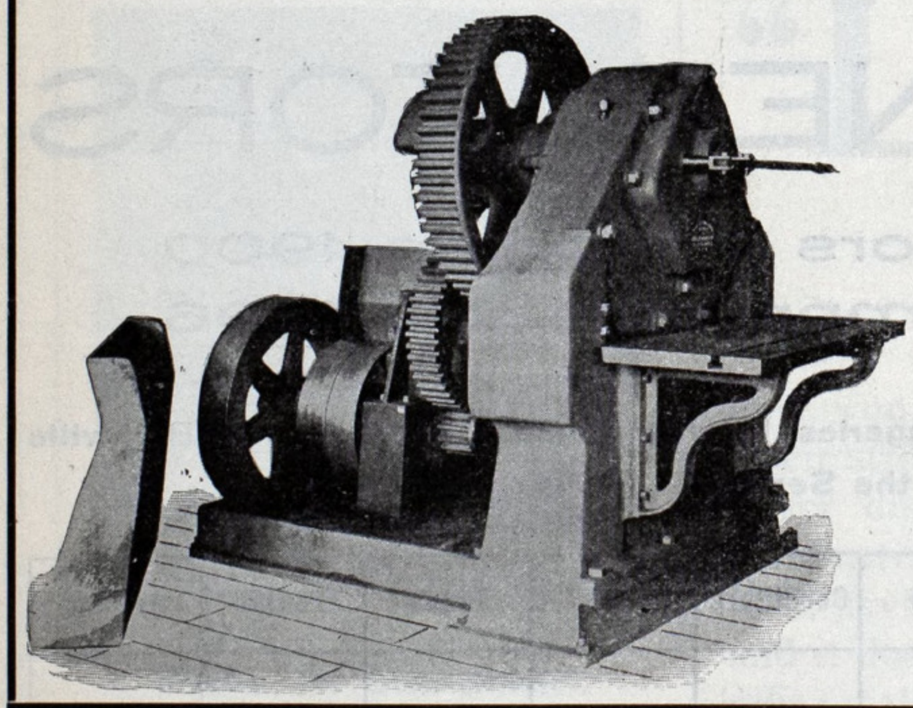

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WHICH IS ARRANGED TO CUT ANGLES SQUARE, OR AT ANY ANGLE, UP TO 60 DEGREES.

All gearing is below the main shaft, which insures smooth running, and is protected from injury by guards. Another valuable feature is that the strain of cutting angles is taken on the center line of each plunger and its bearing, no offsets being required in either slide. We build this shear in several sizes with capacities to cut from the smallest to the largest angles.

Further particulars furnished upon application.

THE CLEVELAND PUNCH & SHEAR WORKS CO.,
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VESSEL HULL FOR SALE.

First-class, newly-constructed passenger and freight hull, 97 ft. over all, 89 ft. keel, 18 ft. beam. Hull has very fine lines. Suitable for great lakes. Draught, light, 3 ft. 10 in. aft and 2 ft. forward. Have high pressure engine, 14x14 in., but no boiler. Will sell reasonably cheap for cash. For particulars address F. W. Reynolds, Canajoharie, N. Y. April 4.

STEAM YACHT FOR SALE.

A small, nicely-equipped, private steam yacht in perfect order. Dimensions: Over all, 57 ft.; beam, 8 ft.; draught, 4 ft. 2 in. Commodious forward and after deck with large pilot-house and comfortable trunk cabin. Having purchased a larger yacht, will sell this at a great sacrifice. Full particulars will be given by addressing O. P. Letchworth, Buffalo, New York. Mar, 28.

Schooner L. S. Hammond For Sale.

We offer this vessel at a very reasonable price. She is at our dock in this city, where she can be seen and examined. Full particulars will be given by calling at our office or writing to address below. Ogdensburg Coal & Towing Co., 44 & 46 North Water street, Ogdensburg, N.Y. Mar. 21.

TUG FOR SALE AT A BARGAIN.

Fishing tug Fred King. One of the best on Lake Erie. Robison Basket Co., Painesville, O. Mar. 25.

FREIGHT AND PASSENGER STEAMER

A. B. Taylor is for sale. Vessel 106 ft. keel, 22 ft. beam. Freight capacity, 115 tons; passengers, 200. Electric light; good sea boat; speed, 11 miles; economical. E. C. Dunbar, Grand Haven, Mich. April 4

LUMBER CARRIERS FOR SALE.

Stmr. White Star	capacity	350,000 feet.
Barge Eva S. Robinson	"	560,000 "
Schr. Annie P. Grover	"	340,000 "
Schr. John Miner	"	350,000 "

All A2 and A2½ and in good condition. Arthur B. Slyfield, Port Huron, Mich. Mar. 21

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity. 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf